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This special edition is dedicated
to the 1st International Conference on Driving Societal Advancement
through Interdisciplinary Innovations
2-3 May 2025
Ulaanbaatar, Mongolia

AIM OF THE CONFERENCE

The mission of the University of the Humanities is to empower creative minds for societal advancement through transformative education and impactful research in the humanities and social sciences. Interdisciplinary research is also among the university's research priorities.

This conference invites contributions that reflect diverse methodologies, perspectives, and disciplines, ultimately aiming to enhance the dialogue on how interdisciplinary innovation can catalyse progress in our societies. Participants are encouraged to share their research findings, best practices, and innovative ideas that exemplify the convergence of knowledge and societal impact. The conference will feature a dynamic program that includes *keynote speakers*, *panel discussions* on interdisciplinary innovations, *paper presentations,* and *best practices and case studies*.

SCOPE OF THE CONFERENCE

The 1st International Conference on Driving Societal Advancement Through Interdisciplinary Innovation invites scholars, researchers, practitioners, and policymakers to explore interdisciplinary approaches to addressing pressing societal challenges.
The conference seeks to foster collaboration across diverse fields, including the humanities, social sciences, technology, and natural sciences, to drive innovation and enhance societal well-being.

KEY THEMES

Interdisciplinary Collaboration
Exploring the advantages and methods of collaborative research across disciplines to foster innovative solutions

Digital Transformation
Exploring how digital tools and technologies reshape research practices and societal engagement in the humanities and social sciences.

Social Impact
Evaluating the role of interdisciplinary research in fostering tangible social change and tackling global issues such as inequality, climate change, and health crises.

Educational Innovations
Exploring transformative educational practices that integrate interdisciplinary approaches to enhance learning and foster critical thinking.

Cultural Perspectives
Highlighting the significance of cultural dimensions in interdisciplinary studies and their influence on societal progress.

Best Practices and Case Studies
Sharing successful interdisciplinary initiatives and projects that have contributed to societal advancement.

BRIEF ON CONFERENCE

The conference took place on May 2-3, 2025, in Ulaanbaatar, Mongolia. On 2 May, there were opening and plenary sessions. On 3 May, there were six parallel sessions, featuring 45 presentations from five different countries: Mongolia, Korea, the United States, Brazil, and India. The conference featured over 90 presenters and 160 participants.

THE INTERNATIONAL CONFERENCE EDITORIAL BOARD

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Key Challenges to Develop News Writer AI Agent Development on Flutter

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Abstract. AI agents significantly enhance the efficiency and quality of news writing by assisting in generating engaging headlines and concise summaries while maintaining the accuracy and objectivity of the original content. These tools leverage advanced algorithms and large language models (LLMs) to streamline the content creation process, ultimately improving audience engagement and journalistic productivity. The approaches range from using neural network algorithms to LLMs and question- answering systems, each with its unique strengths and challenges. Agent, like News writers, operate in a dynamic and fast-paced environment where staying updated with current global events is crucial. The digital era has transformed how journalists gather, verify, and disseminate information. The integration of Natural Language Processing (NLP) into a Flutter-based news app offers an amazing way to deliver personalized news feeds tailored to individual user experiences. By leveraging NLP techniques, the app can analyse user behaviour, understand content, provide relevant news recommendations, neural machine translations and news content summarizations. Developing a centralized AI-powered news app using Flutter presents a unique set of challenges that span technical, ethical, and operational domains. We conducted this research to discover ways to overcome these challenges and spectacles. In particular, we used artificial intelligence to automatically translate news into the reader's native language and to provide a summary view instead of a large amount of text when reading in detail.

***Keywords*:** *AI, Agent, NMT, news summarization, news writer.*

Introduction

AI agents assist news writers by using machine learning algorithms to analyse historical user behaviour, generating engaging headlines optimized for click-through rates, and automatically summarizing articles, allowing journalists to produce concise, relevant content efficiently while enhancing audience engagement. On the user sight, it also can make searches and assist news readers by conducting multidimensional information retrieval and press releases encapsulation. They propose multiple headlines based on core event elements and background information, ensuring engaging and relevant content for news articles. This makes all the task easy to news writers by generating multiple headlines for selection, guiding the writing process with keywords, and enabling post-editing of AI-generated outputs. This collaboration enhances headline quality, reduces task effort, and maintains perceived trust and control in the writing process. Nowadays, Generative pretrained transformer models generate attention-grabbing headlines by analysing lexical and grammatical characteristics, enhancing reader engagement. We are developing flutter app that works like ai agent with an encoder-decoder feedforward neural network with multi headed attention, effectively generating concise and grammatically correct headlines from news articles, assisting writers by paraphrasing content and capturing the gist of the text for engaging summaries. Our app can collect hot topics from international sources with open API and html Dom reader. If user log in from specific location, we can analyse user’s locale and show up news results in one’s native language and really productive summary of every

single news. These methods aim to condense large volumes of text into concise, informative summaries while maintaining the accuracy and objectivity of the original content then neural machine translation is further step of this process.

Literature review

First of all, we want to make comprehensive analysis of these challenges, supported by insights from relevant research papers. AI tools can produce concise and accurate summaries, reducing the time journalists spend on this task (Yuan et al., 2024). The summarization process is enhanced by LLMs, which can quickly analyse large volumes of information and extract key points (Liu et al., 2024). AI systems generate compelling headlines that attract reader attention, often outperforming human-generated options in terms of engagement metrics (Ding et al., 2023). Interaction methods, such as guiding the AI or selecting from its outputs, have been shown to improve the quality of headlines while maintaining a sense of control for the writer (Ding et al., 2023). Despite the benefits, reliance on AI raises concerns about algorithmic bias and the potential erosion of journalistic integrity (Yuan et al., 2024). It is crucial for journalists to complement AI capabilities with their expertise to mitigate these ethical issues. While AI agents provide substantial support in news writing, the balance between automation and human oversight remains essential to uphold journalistic standards and ethics. The use of neural network algorithms, such as the mBART model, allows for multilingual summarization, ensuring that summaries are both concise and accurate. This approach utilizes datasets like the gazeta dataset and employs metrics such as ROUGE and BLEU to evaluate the quality of the summaries (Akhmedova et al., 2024). The system is implemented using deep learning libraries like PyTorch and Fairseq, and it operates through interfaces like Telegram bots to deliver summaries efficiently (Akhmedova et al., 2024). Advanced models like PEGASUS utilize transformer-based encoder-decoder architectures to perform abstractive summarization, which generates new sentences that capture the essence of the original text. This method excels in producing coherent and contextually rich summaries, although it faces challenges in maintaining factual accuracy (Shanthakumari et al., 2024). PEGASUS also offers features like attention mechanisms and self-attention layers to enhance the summarization process, allowing for customization based on user preferences (Shanthakumari et al., 2024). TextRank, a graph-based algorithm, is used for extractive summarization, which involves selecting and rearranging existing text segments. This method is efficient for quick summaries and is enhanced by caching techniques to improve retrieval speed and user experience (Bongale et al., 2022). A novel approach involves generating structured summaries using question-and-answer pairs. This method predicts attention maps to identify important snippets in the article and generates questions that capture key aspects of the news story. It has shown promising results in terms of BLEU scores for question generation and summarization (Wang & Yu, 2019). While these methods provide effective solutions for news summarization, challenges such as the tokenization, stop word removal, and stemming can be applied to news articles to extract meaningful information (Kanakaraj & Kamath, 2014). This technique identifies and categorizes named entities in text, such as names of people, places, and organizations. NER can be used to filter news articles based on user interests. By analysing the sentiment of news articles, the app can recommend content that aligns with the user's preferences, such as positive, negative, or neutral news (Kazai et al., 2016). Techniques like Latent Dirichlet Allocation (LDA) can be used to identify topics in news articles, enabling the app to recommend articles based on the user's topic preferences (Kazai et al., 2015). NLP can be used to summarize long news articles into concise summaries, saving users time and improving the reading experience (Jin et al., 2024). By

analysing user interactions such as clicks, likes, shares, and comments, the app can infer user preferences and tailor the news feed accordingly (Kazai et al., 2015) (Kazai et al., 2016). The app can use the user's location to deliver geographically relevant news, ensuring that users receive news that is most pertinent to their local context (Kazai et al., 2016). By integrating with social media platforms like Facebook and Twitter, the app can leverage user interests and preferences expressed on these platforms to further personalize the news feed (Kazai et al., 2016). This technique involves recommending news articles based on the preferences of similar users. By identifying patterns in user behaviour, the app can deliver more relevant content (Kazai et al., 2015). One of the primary challenges in developing a Flutter-based news app is ensuring optimal performance. Flutter's cross-platform nature, while advantageous, can lead to issues such as memory insufficiency and varying performance across different devices. Additionally, network images and animations, which are common in news apps, can consume significant bandwidth and affect app performance. These issues can be exacerbated when integrating AI-powered features, which often require heavy computational resources. Integrating AI-powered features, such as text and image generation, chatbots, and personalized content delivery, can be complex. While tools like OpenAI and ChatGPT have shown promise in enhancing user experience, challenges such as ensuring the accuracy and naturalness of generated content remain. Moreover, the integration of AI models with Flutter's frontend can be problematic, as seen in the case of AI food classification models. Flutter's cross-platform design capabilities, while beneficial, present challenges in ensuring a seamless user experience across different platforms. AI-driven design solutions can help optimize user interfaces, but the complexity of multi-modal interactions and personalized content delivery across platforms requires careful consideration. AI-powered news apps are susceptible to algorithmic bias, which can lead to the spread of misinformation and the erosion of editorial oversight. Ensuring transparency and accountability in AI-driven content generation and recommendation systems is crucial to maintaining user trust. The integration of AI in journalism raises ethical concerns, such as the potential for AI-generated outputs to undermine the role of human journalists and the risk of perpetuating misinformation. Ensuring that AI systems adhere to ethical standards and maintain journalistic integrity is a significant challenge. AI-powered news apps often rely on user data to provide personalized experiences, raising concerns about privacy and data security. Ensuring that user data is handled responsibly and securely is essential to maintaining trust. The development of an AI-powered news app requires collaboration between AI professionals, journalists, and developers. However, challenges such as differing perceptions of AI's role and the lack of communication between these groups can hinder effective collaboration. The development and implementation of AI-powered news apps can be resource-intensive, particularly for smaller organizations. The reliance on funding from large corporations, such as Google, can limit the accessibility of AI technologies for smaller players in the news industry. Despite the potential benefits of AI-powered news apps, user acceptance and trust can be challenging to achieve. Concerns about the accuracy of AI- generated content and the potential for bias can lead to scepticism among users.

Methodology

For the various information sources, we need establish news organizations remain a primary source for journalists. These outlets often have extensive networks of correspondents and reporters who provide firsthand accounts of events. Journalists rely on these sources for their credibility and reliability (Christensen & Khalil, 2021). Governments, corporations, and other organizations issue press releases to communicate official information. Journalists

regularly monitor these releases to gather factual data and quotes. Conducting interviews with experts, eyewitnesses, and individuals directly involved in events is a cornerstone of journalism. These interactions provide unique insights and personal perspectives that enhance news stories (Hendrickx, 2023). Social media has become an indispensable tool for journalists. Platforms like Twitter, Facebook, and Instagram serve as real-time sources of information, especially during breaking news events. Journalists monitor these platforms to gather eyewitness accounts, videos, and images. Citizen journalism has flourished in the digital age. Ordinary individuals often share their experiences and observations on social media, providing valuable content for journalists. However, verifying the accuracy of this content is a significant challenge (Gehrke & Benetti, 2020) (Diakopoulos et al., 2012). News aggregators compile content from multiple sources, allowing journalists to quickly scan a wide range of topics and identify emerging trends. These platforms help journalists stay updated without having to visit numerous individual websites (Voskarides et al., 2021). Journalists often cross-check information from multiple sources to ensure accuracy. This process involves comparing data from traditional media, official statements, and social media to corroborate facts (Middleton et al., 2018). Independent fact-checking organizations play a crucial role in verifying the accuracy of claims made in public discourse. Journalists frequently consult these sites to ensure the information they report is truthful (Ahmad, 2023). The rise of digital journalism has led to the development of tools designed to assist in verifying social media content. These tools help journalists assess the credibility of sources and detect potential misinformation. AI and machine learning are increasingly being used to analyse large volumes of data, detect patterns, and predict trends. These technologies can help journalists identify breaking news and flag potentially false information. The system architecture for the Flutter-based news app should be designed to efficiently integrate NLP and personalization features. The app should be able to ingest news articles from various sources, including RSS feeds, APIs, and web scraping. The data should be stored in a structured format for easy access and analysis (Kanakaraj & Kamath, 2014). The NLP pipeline should include text preprocessing, tokenization, entity recognition, sentiment analysis, and topic modeling (Table 1). These processes can be implemented using libraries such as NLTK, spaCy, or Gensim (Kanakaraj & Kamath, 2014). The app should maintain a user model that captures the user's preferences, interests, and behaviour. This model should be updated continuously based on user interactions (Kazai et al., 2015) (Kazai et al., 2016). The recommendation engine should use the user model and the processed news data to deliver personalized news recommendations. Techniques such as collaborative filtering, content-based filtering, and hybrid approaches can be employed (Kazai et al., 2015) (Kazai et al., 2016). The Flutter-based user interface should be designed to provide an intuitive and engaging experience. Features such as swiping, liking, and sharing should be included to allow users to interact with the content and provide feedback (Kazai et al., 2015) (Kazai et al., 2016). The app should be designed to handle large volumes of data and user interactions. Cloud-based services such as AWS, Google Cloud, or Azure can be used to scale the app as needed. The app should be capable of processing news articles and user interactions in real- time to deliver up-to-the-minute personalized news feeds. User data should be handled with care to ensure privacy and security. Data anonymization, encryption, and secure authentication mechanisms should be implemented to protect user information. The app should incorporate user feedback mechanisms to continuously improve the personalization and recommendation algorithms. Explicit feedback, such as likes and dislikes, and implicit feedback, such as reading time and scrolling behaviour, should be collected and analysed (Kazai et al., 2015) (Kazai et al., 2016).

Table 1: Comparison of NLP Techniques and Their Applications in News Personalization

NLP Technique	Application in News Personalization
Text Preprocessing	Cleaning and tokenizing news articles to extract meaningful information for analysis.
Named Entity Recognition	Identifying and categorizing named entities in news articles to filter content based on user interests.
Sentiment Analysis	Analyzing the sentiment of news articles to recommend content that aligns with user preferences.
Topic Modeling	Identifying topics in news articles to recommend content based on user preferences.
Summarization	Summarizing long news articles into concise summaries to save user's time.
Speech Recognition	Allowing users to request news updates through voice commands.
Text-to-Speech	Delivering news summaries or full articles in audio format.
Collaborative Filtering	Recommending news articles based on the preferences of similar users.
Context-Aware Recommendations	Delivering news based on the user's location, time of day, and recent activities.
Crowd-Curated Content	Providing news that has been vetted and recommended by other users.

Results

To overcome technical challenges, developers should focus on optimizing app performance by improving cache management and reducing bandwidth consumption. Additionally, leveraging generative AI tools, such as ChatGPT, can accelerate the development process, though careful consideration of their limitations is necessary. To address ethical challenges, news organizations should implement robust frameworks for accountability and transparency in AI-driven content generation and recommendation systems. Regular audits of AI systems and the documentation of development processes can help mitigate risks such as algorithmic bias and misinformation. Encouraging cross-functional collaboration between AI professionals, journalists, and developers is essential for the successful development of AI- powered news apps. Additionally, educating users about the benefits and limitations of AI can help build trust and improve user acceptance. The future of AI in journalism lies in the development of multimodal systems that can contextualize information through text, images, audio, and video (Table 2). By embracing these advancements and ensuring ethical oversight, news organizations can harness the transformative potential of AI while maintaining the core values of journalism.

Table 2: Key Challenges and Recommendations

Challenge	Description	Recommended Solution
Performance and Optimization	Memory insufficiency and varying performance across devices.	Optimize app performance by improving cache management and reducing bandwidth consumption.

Algorithmic Bias and Misinformation	Risk of spreading misinformation and undermining editorial oversight.	Implement robust frameworks for accountability and transparency in AI-driven systems.
Cross-Functional Collaboration	Challenges in collaboration between AI professionals, journalists, and developers.	Encourage cross-functional collaboration and provide training for journalists on AI tools.
Resource	High resource requirements for AI	Explore cost-effective solutions and seek

Challenge	Description	Recommended Solution
Limitations	implementation.	partnerships to access AI technologies.

Discussion

Digital era transforms journalism's creation, dissemination, and consumption. Examines challenges and opportunities in contemporary journalism landscape. Journalists as curators and investigative watchdogs in information deluge. Social media reshapes news sources and engagement possibilities. Data journalism enhances storytelling, requiring digital literacy.
Promoting media literacy is essential for informed consumption. Insights guide practitioners, scholars, and media consumers in digital age.

Conclusion

In conclusion, news writers like Agent employ a combination of traditional and digital sources to stay updated with current global events. While traditional sources like mainstream media and official statements remain vital, social media and user-generated content have become essential components of modern journalism. However, the digital age also presents challenges, such as the need for robust verification strategies and the ethical implications of rapid information dissemination. By leveraging both established and emerging tools and techniques, journalists can continue to produce accurate, timely, and impactful news content. Integrating NLP into a Flutter-based news app offers a powerful way to deliver personalized news feeds tailored to individual user preferences. By leveraging NLP techniques such as text preprocessing, entity recognition, sentiment analysis, and topic modeling, the app can analyse user behaviour and deliver relevant news recommendations. The app can also incorporate advanced features such as voice-assisted delivery, context-aware recommendations, and crowd-curated content to enhance the user experience. However, challenges such as data privacy, scalability, algorithmic bias, and user fatigue must be addressed to ensure the app's success. Future developments should focus on multimodal NLP, explainable AI, and edge AI to further enhance the app's capabilities and user experience. Developing a centralized AI- powered news app using Flutter is a complex endeavour that requires careful consideration of technical, ethical, and operational challenges. By addressing these challenges through optimized performance, ethical AI use, and fostering collaboration, developers can create a seamless and trustworthy user experience that leverages the full potential of AI in journalism.

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A Novel Framework for Calibrating Signal Processing in Medical Diagnostic Equipment

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Abstract - Mongolia relies entirely on imported medical diagnostic equipment, which, despite its high cost, often lacks standardized quality assurance and compatibility verification. Ensuring the accuracy and reliability of diagnostic outcomes necessitates the establishment of comprehensive calibration methodologies, standardized operational protocols, and regulatory frameworks. This study focuses on the Electrocardiogram (ECG) as a case study, proposing an alternative framework for assessing equipment readiness through express investigation techniques. Regular calibration and technical monitoring, in compliance with international metrology standards, are critical for maintaining the precision and reliability of diagnostic measurements. The proposed framework aims to enhance the performance and regulatory compliance of medical diagnostic equipment, thereby improving overall healthcare outcomes.

Keywords: *Electrocardiogram, Diagnostics, Signal, Metrology, ECG, Calibration, Tools and equipment*

I. Introduction

The Healthcare industry is the area that the country should pay utmost attention to develop. High technology equipment with stable function and good quality are a few of the major constitutes of modern medical service. The Electrocardiogram (ECG) is diagnostic equipment which is commonly used for medical diagnostics in many countries. The ECGs can be dependent on their operation principles, technical characteristics, design and the base of the elements used in production; different manufacturers produce the equipment with different technical characteristics. In Mongolia; during 1965 – 2010, 31 types of ECG are used which are produced by 41 manufacturer in 19 countries from 1965 to 2010. Those equipment were either imported or supplied under grants through various organizations. Being a developing country, more serious attention should be paid to this issue. Now it is necessary to strengthen technical control on metrological equipment that essentially affects the diagnoses and to develop a comprehensive methodology for equipment control.

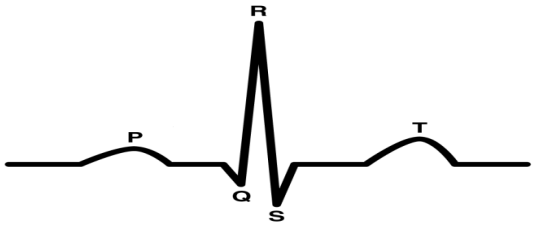
II. Strategy

Before using the diagnostic equipment, it is important to inquire technically normal functioning of the equipment and to check its readiness for diagnosis. A case of heart bio-electrocardiogram equipment was studied for this purpose. According to the MNS OIML5139:2002 international standard [1], there are 16 requirements for normal functioning of heart bio-electrocardiogram equipment should be considered, however, these are not feasible in terms of time and training. This paper is to provide a practical solution to calibrate the machine before using for diagnosis. For this, a specially processed control signal is given to the input of the heart bio-electric cardiogram equipment and the readiness of the equipment can be checked out within a short period of time by comparing result of control signals with the test records. Therefore,

development of the control signal options for bio-cardiogram equipment is required. For this reason, it is needed to get common pattern of the Mongolian people's ECGs. ECGs of people from different parts of the country were analyzed in order to get the average pattern. In doing so, 3000 ECGs were recorded, examined and confirmed by the professionals were used as reference of this research paper. An Honorary Doctor in Mongolia Dr. A.Ulziikhutag [2], has divided the Mongolia's landscape into the following zones: 1-Dornod elevations, 2-Khentii mounts, 3-Govi-Altai middle height mounts, 4-Khangai middle height mounts; and determined the ECG sketch.

Bio-electric signal of a normally functioning heart is presented as a curve consisting of five basic grinders of P, Q, R, S and T (Figure 1).

Figure 1. Positions of the ECG curve grinders of normal functioning hearts.



The corresponding amplitudes expressed in millimeters are shown in Table 1.

Table1. Q grinder amplitudes of the ECG signals of people from 4 zones

Connection	Zone 1	Zone 2	Zone 3	Zone 4	Average
I	0.10 ± 0.01	0.10 ± 0.01	0.26 ± 0.02	0.27 ± 0.01	0.18
II	0.12 ± 0.01	0.13 ± 0,01	0.31 ± 0.01	0.32 ± 0.01	0.22
III	0.30 ± 0.01	0,29 ± 0,01	0.42 ± 0.02	0.47 ± 0.01	0.37
aVR	0.10 ± 0.01	0.10 ± 0.01	0.26 ± 0.02	0.27 ± 0.01	0.19
aVL	0.11 ± 0.01	0.11 ± 0,01	0.28 ± 0.01	0.30 ± 0.02	0.20
aVF	0.21 ± 0.02	0.25 ± 0,02	0.33 ± 0.01	0.39 ± 0.02	0.29
V_1	0.12 ± 0.01	0.13 ± 0,01	0.31 ± 0.01	0.32 ± 0.01	0.21
V_2	0.10 ± 0.01	0.12 ± 0,01	0.31 ± 0.01	0.30 ± 0.01	0.20
V_3	0.12 ± 0.01	0.11 ± 0.01	0.24 ± 0.02	0.29 ± 0.01	0.16
V_4	0.10 ± 0.01	0.10 ± 0.01	0.17 ± 0.01	0.19 ± 0.01	0.14
V_5	0.26 ± 0.02	0.37 ± 0.02	0.48 ± 0.02	0.50 ± 0.02	0.40
V_6	0.30 ± 0.01	0.35 ± 0.02	0.47 ± 0.02	0.51 ± 0.02	0.41
Average	0.19	0.21	0.34	0.37	0.277

Table 2. R grinder amplitudes of the ECG signals of people from 4 zones

Connection	Zone 1	Zone 2	Zone 3	Zone 4	Average
I	4.17 ± 0.14	4.43 ± 0.17	5.70 ± 0.14	5.91 ± 0.15	5.05
II	6.74 ± 0.19	7.47 ± 0.21	8.87 ± 0.21	9.25 ± 0.18	8.08
III	6.22 ± 0.17	6.26 ± 0.16	4.47 ± 0.17	4.91 ± 0.16	5.46
aVR	1.84 ± 0.06	2.22 ± 0.07	1.06 ± 0.05	1.15 ± 0.05	1.57

aVL	1.98 ± 0.12	1.92 ± 0.12	2.51 ± 0.15	2.47 ± 0.13	2.22
aVF	7.81 ± 0.15	8.26 ± 0.16	6.17 ± 0.16	6.56 ± 0.14	7.20
V_1	4.91 ± 0.13	4.10 ± 0.12	3.04 ± 0.11	2.45 ± 0.09	3.60
V_2	7.35 ± 0.13	7.53 ± 0.13	6.03 ± 0.16	6.12 ± 0.14	6.76
V_3	8.95 ± 0.17	9.15 ± 0.18	9.70 ± 0.17	10.0 ± 0.17	9.45
V_4	10.15 ± 0.17	11.4 ± 0.17	11.3 ± 0.18	13.4 ± 0.19	11.56
V_5	9.62 ± 0.18	10.4 ± 0.17	11.3 ± 0.18	12.2 ± 0.15	10.88
V_6	8.50 ± 0.16	8.75 ± 0.18	10.6 ± 0.19	10.9 ± 0.15	9.69
Average	6.5	6.82	6.73	7.11	7.233

Table 3. S grinder amplitudes of the ECG signals of people from 4 zones

Connection	Zone 1	Zone 2	Zone 3	Zone 4	Average
I	4.22 ± 0.13	4.31 ± .12	1.93 ± 0.13	1.49 ± 0.11	2.99
II	2.76 ± 0.13	2.70 ± 0.13	2.56 ± 0.15	2.37 ± 0.10	2.60
III	0.84 ± 0.09	0.87 ± 0.10	2.65 ± 0.16	2.50 ± 0.14	1.72
aVR	6.07 ± 0.13	6.43 ± 0.17	7.87 ± 0.17	8.54 ± 0.15	7.23
aVL	3.32 ± 0.15	3.59 ± 0.15	3.43 ± 0.14	2.50 ± 0.13	3.21
aVF	0.44 ± 0.07	0.56 ± 0.07	1.82 ± 0.12	2.06 ± 0.11	1.22
V_1	7.26 ± 0.14	7.26 ± 0.15	8.92 ± 0.16	9.09 ± 0.14	8.13
V_2	10.8 ± 0.25	11.1 ± 0.27	12.8 ± 0.28	13.6 ± 0.25	12.10
V_3	10.2 ± 0.21	10.2 ± 0.23	9.94 ± 0.21	10.3 ± 0.20	10.16
V_4	7.75 ± 0.19	8.16 ± 0.18	6.17 ± 0.19	6.0 ± 0.17	7.02
V_5	5.46 ± 0.17	5.83 ± 0.17	3.41 ± 0.13	3.06 ± 0.14	4.44
V_6	3.01 ± 0.17	3.07 ± 0.16	1.80 ± 0.14	1.08 ± 0.20	2.24
Average	5.12	5.34	4.76	5.22	5.534

Table 4. T grinder amplitudes of the ECG signals of people from 4 zones

Connection	Zone 1	Zone 2	Zone 3	Zone 4	Average
I	1.23 ± 0.06	1.35 ± 0.08	2.08 ± 0.07	2.00 ± 0.06	1.67
II	2.53 ± 0.08	2.51 ± 0.09	2.48 ± 0.08	2.50 ± 0.07	2.50
III	1.65 ± 0.07	1.81 ± 0.07	1.10 ± 0.07	1.29 ± 0.08	1.46
aVR	2.35 ± 0.06	2.30 ± 0.05	2.32 ± 0.06	2.29 ± 0.06	2.32
aVL	0.48 ± 0.05	0.51 ± 0.5	0.63 ± 0.06	0.67 ± 0.05	0.57

aVF	2.00 ± 0.07	2.07 ± 0.07	1.29 ± 0.06	1.43 ± 0.05	1.70
V_1	0.33 ± 0.09	0.35 ± 0.08	0.11 ± 0.09	0.20 ± 0.07	0.25
V_2	1.73 ± 0.12	1.95 ± 0.11	3.06 ± 0.13	3.33 ± 0.13	2.52
V_3	3.55 ± 0.11	3.85 ± 0.11	4.98 ± 0.10	5.29 ± 0.09	4.42
V_4	4.28 ± 0.13	4.39 ± 0.14	4.82 ± 0.13	5.23 ± 0.13	4.68
V_5	2.86 ± 0.09	2.91 ± 0.09	3.65 ± 0.12	3.77 ± 0.11	3.30
V_6	1.80 ± 0.08	1.90 ± 0.09	2.43 ± 0.10	2.48 ± 0.10	2.15
Average	2.07	2.12	2.41	2.54	2.101

Table 5. Amplitudes of Q,R,S,T grinders of Mongolians' ECG signals

	I	II	III	aVR	aVL	aVF	V_1	V_2	V_3	V_4	V_5	V_6	AVG
R	5.05	8.08	5.46	1.57	2.22	7.2	3.6	6.76	9.45	11.56	10.88	9.69	7.233
S	2.99	2.6	1.72	7.23	3.21	1.22	8.13	12.1	10.16	7.02	4.44	2.24	5.534
T	1.67	2.5	1.46	2.32	0.57	1.7	0.25	2.52	4.42	4.68	3.3	2.15	2.101

The study shows that the heart electric signals can be designed by using several methods; and Q,R,S,T grinders are used as analog signals.

The analog signal has values that are continual during a given time. In other words, it has endless values for a given period of time. There are two determinants of analog signals. They are:

1. Frequency: Number of waves that are isochronous, i.e. it is expressed by the number of the cycles for a second.

2. Amplitude: Shows the speed of the waves within the given period of time. This determines the magnitude and noise of the signals.

III. Signal processing

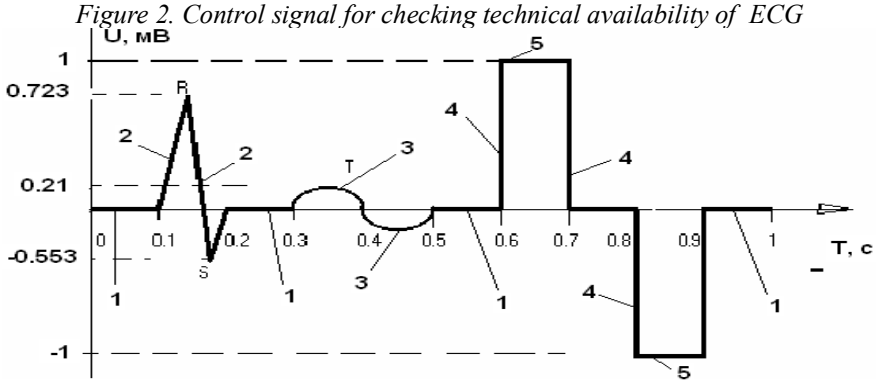
The availability of the ECGs is required to be checked in accordance with 16 technical requirements among which the following must be regularly inspected before ECG:

1. Relative error on voltage measuring (by the signal amplitude of voltage with linear growth)
2. Relative error on sensitivity (by sinusoid signals)
3. Relative error on measuring the time of pulse duration (by rectangle pulses)
4. Baseline deviation (by zero line lasting for 60 seconds)

The description of the signal combination to be used for checking the above indicators can be presented as the curve shown in Figure 2. The idea is to take this as the control signal for the evaluation of technical availability of ECG, to get a signal of same form, size and

rate of change and to develop a control signal for testing. Shown in a coordinate system (Figure 2).

Figure 2. Control signal for checking technical availability of ECG



Authors have considered that the control signal for ECG should have common characteristics of heart bio-electric cardiogram including linear function of RS grinder, parabolic function of T grinder, as well as 1mB signal of rectangle form used for each channel. Mathematical processing was done for the heart bio-electric cardiogram records taking into consideration that the signal for checking particular equipment shall have the same parameters and characteristics with the input signal of the equipment. We intended to get a suitable option of control signals using coordinate method to express the heart bio-electric records through mathematical functions. Configuration was made in the following way: the beginning of the coordinates would coincide with the beginning of a whole period of a ECG, i.e. the starting point of the heart bio-electric signal would place on the X-axis. A period of the control signal is described at the coordinate system by the first and final coordinates of the elements. If each element with number "i" is expressed by 6 measurements of b_i, x_i, y_i, x_{i+1}, y_{i+1}; then the first and final coordinates of the control signal elements will be x_i, y_i and x_{i+1}, y_{i+1}. For the parabolic elements, the coordinates of the extreme point will be determined as a_i (Y-axis) and b_i (X-axis). For the linear elements, a_i and b_i equal to zero, so the equation for the control signal elements can have the following form:

For parabola:

$$y = \frac{y_i - a_i}{(x_i - b_i)^2} \cdot (x - b_i)^2 + a_i \qquad (1)$$

For linear:

$$y = y_i + \frac{y_{i+1} - y_i}{x_{i+1} - x_i} \cdot (x - x_i) \qquad (2)$$

In order to develop an algorithm for the control signal, each part is required to be expressed in the form of linear and quadratic function. Therefore, let's name each part of the control signal as "element", write corresponding functions for lines and parabolas and develop algorithm. Time zones are classified as follows:

1. Zone 1 - (0.100 sec - 0.125 sec)
2. Zone 2 - (0.175 sec - 0.200 sec)
3. Zone 3 - (0.300 sec - 0.400 sec)
4. Zone 4 - (0.400 sec - 0.500 sec)
5. Zone 5 - (0.600 sec - 0.700 sec)
6. Zone 6 - (0.700 sec - 0.800 sec)

7. Zone 7 - (0.800 sec - 0.900 sec)
8. Zone 8 - (0.900 sec - 1.000 sec)

Mathematical descriptions and forms corresponding to each zone are shown in Figure3.a-3.e.

Figure 3.a

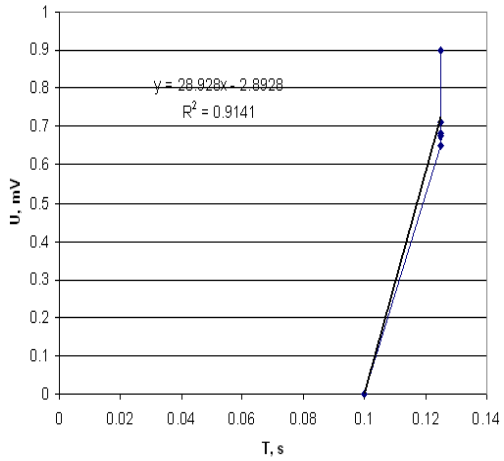


Figure 3. b

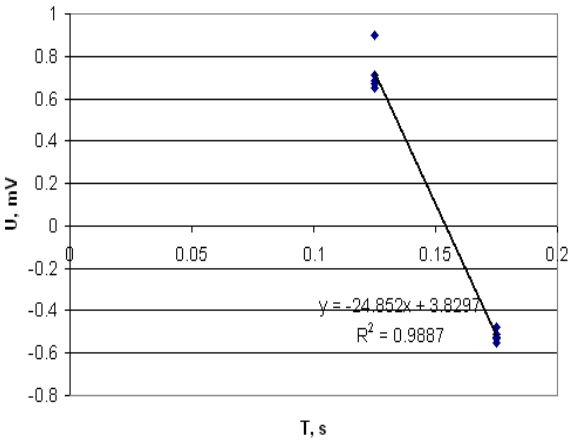


Figure 3.c

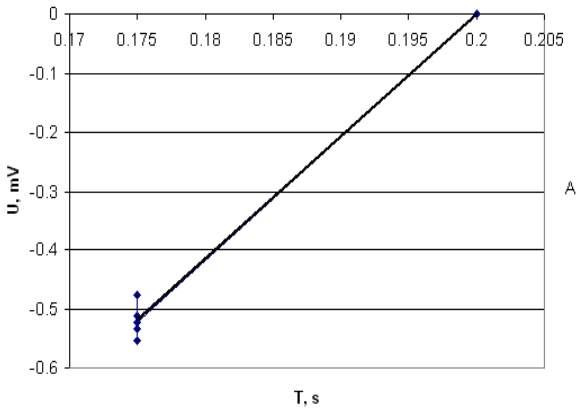


Figure 3.d

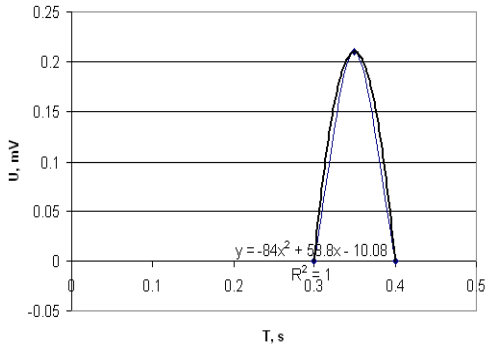
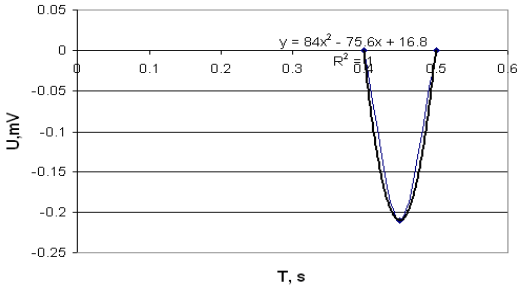


Figure 3.e



Here:

a and b – determine the function of R grinder

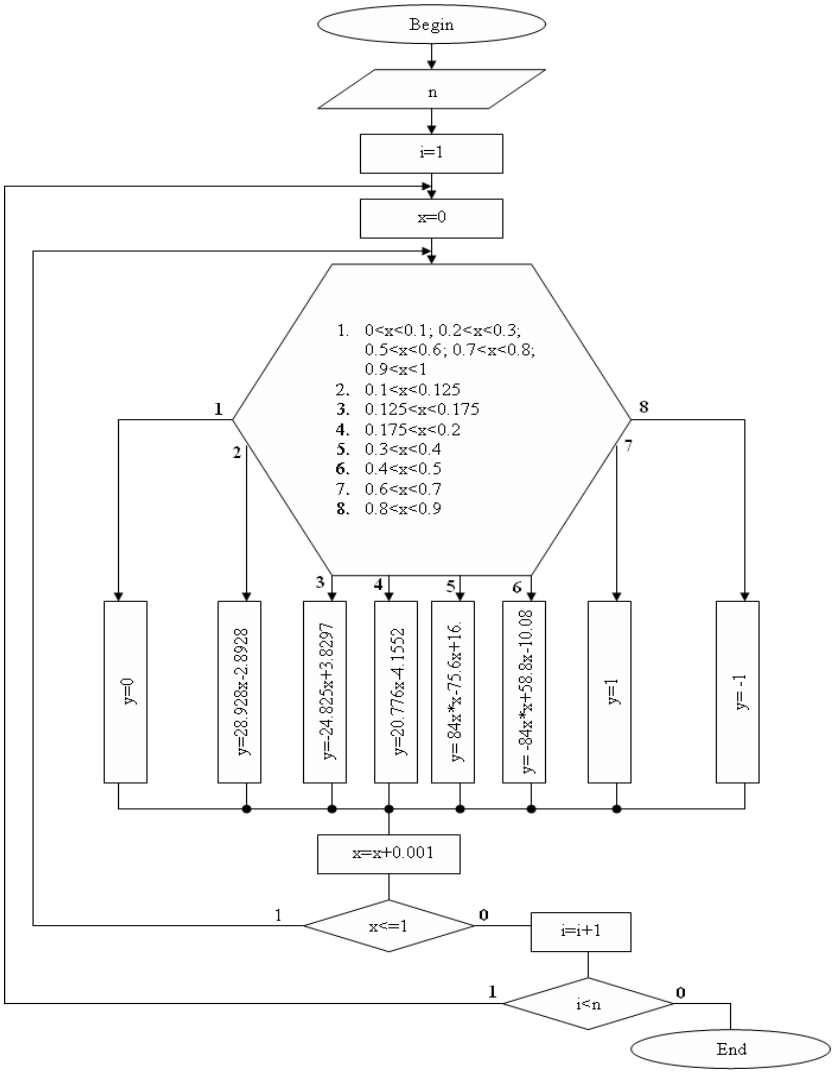
c - determines the function of S grinder

d and e - determine the function of T grinder.

The sample control signal consists of 3 parts including grinder part described in a combination form, harmonic part and the part of rectangle pulses. A condition similar as much as possible to the description of a whole period of common ECG was considered when the order of placing these parts was set up.

The purpose of developing the sample control signal is to evaluate technical characteristics and availability of the ECGs, so these parts were transformed into clear rectangular pulses, clear linear and half-circle forms. After that, algorithm for the sample control signal development program was written considering the above 3 basic parts to have a linear part to be described on the zero line between them with the given order. Descriptions of eight functions in total were included in the algorithm and it was completed like a y=0 line to be drawn on the zero line between the functions. The block scheme of the developed algorithm is shown in Figure4.

Figure 4. Algorithm for sample control signal



To form out a sample control signal for a whole period, the equations corresponding to x-values along the X-axis shall be drawn using optional operator until a whole period finishes and this shall be repeated until “n” periods finish.

Conclusion

The data used in this research paper are the results from the professional measurement that made for analyzing various ECGs from different parts of Mongolia and to use for diagnosis.

Therefore, it can be said that one could get true and objective data covering not only ECGs, but also the results of clinical examinations and diagnostics in general. Mathematical processing was done for these data and optimal option of the sample control signal for monitoring the normal functioning of heart bio-electric cardiogram equipment was developed. The methodology of the evaluation of the function of ECG equipment being checked by the sample signal allows quick evaluation of the equipment going to be used.

Inspection of normal technical functioning and determination of the equipment's readiness for diagnosis have practical significance. Because there are various medical equipment produced in different countries with different technologies are used in Mongolia, these methods are very important to improve medical diagnostics and treatments.

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Estimating the Ipact of Public Investment on Employment by Economic Sectors in Mongolia

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Abstract. The purpose of this study is to assess the impact of public investments on the economic sectors of Mongolia in terms of employment. The study evaluates the effect of public investment on job creation using Wassily Leontief's input-output analysis. The calculations are based on data regarding gross domestic product and employment across economic sectors, provided by the National Statistical Office of Mongolia. The study found that investments in specific economic sectors have varying impacts on job creation, with the "Agriculture, forestry, fishing and hunting" sector showing the highest positive effect compared to others. The findings also indicate that the proper allocation of public investments plays a crucial role in increasing employment and, consequently, improving the standard of living for citizens. This research offers policymakers valuable insights for designing effective public investment plans and employment growth strategies.

Keywords: *Job creation, Input-output analysis, Impact of investment, GDP, Allocation of public investment*

Introduction

Mongolia needs to effectively utilize budget investments to stimulate economic growth and employment. Budget investments have both direct and indirect impacts on various sectors of the country's economy. Evaluating these impacts allows policymakers to maximize the return on investment, define and support key economic sectors, and create more jobs.

The study was conducted to assess the impact of budget investments on the economic sectors of Mongolia and to explore their role in employment and social well-being. We proposed two hypotheses in this research as follows:

- **Hypothesis 1**: Public investment in the agriculture, forestry, fishing, and hunting sector—which is the most labor-intensive sector—has a significantly higher impact on employment generation compared to other economic sectors in Mongolia.
- **Hypothesis 2**: Sectors with high GDP contributions, such as mining and real estate, do not necessarily generate proportionately high employment from public investment.

To test these hypotheses, we analyze the relationship between budget investments and economic sectors using input-output analysis.

Literature review

Employment is a critical indicator of a country's economic condition and is directly linked to the standard of living of its citizens. As such, employment is analyzed from various perspectives, including economics, social sciences, and public policy. Research in this area focuses on understanding key employment factors, working conditions, the impact of government policies, and the relationships between employment and economic growth. This section of the study outlines the core theoretical concepts related to employment and explores the main factors that influence it.

Employment-related theories are a crucial component of macroeconomics. These theories acknowledge the short-term instabilities of employment and offer various explanations for them. Theories of employment and the labor market can be classified from the perspectives of classical theory, Keynesian theory, and new classical theory.

Employment theories

Classical theory, based on the research works of previous economists such as Adam Smith and David Ricardo, holds the core idea that employment and wages are determined by the equilibrium of the labor market—the supply and demand of labor. In a free-market economy, labor markets are assumed to be efficient and flexible in terms of wages and employment (Stirati, 2012). Labor shortages create a conflict between employers' reluctance to raise wages in order to maintain company profits and the inevitable need to increase wages to attract workers and remain competitive in the labor market (Smith, 1976). While the wage gap offered by employers remains relatively stable in the short term, the wage gap resulting from job differentials is gradually widening (Ricardo, 1951). Classical economic theory examines employment from two fundamental perspectives. First, it posits that “wages are equal to the marginal product of labor”. As the number of workers increases, the real wage rate decreases due to the diminishing returns of marginal productivity (Tracy, 1988). However, unemployment remains high if workers refuse to accept lower real wages corresponding to the decline in productivity. The second postulate is the concept that the real wages each employee receives should be set in a way that motivates them to work (Tracy, 1988). If wages fall to a level that discourages workers, they are expected to stop working. Classical economists conclude that if a society is free from war, drought, disease, or other perils, the market will naturally lead to full employment.

Keynes and his followers argue that under capitalism, a certain level of unemployment persists, with no guarantees or mechanisms ensuring full employment. Indeed, no country has achieved or even come close to full employment (Gundsambuu, 1994). Therefore, proper government intervention is necessary to increase employment and stimulate overall production. Keynes' main contribution to employment theory is the concept of aggregate demand. Aggregate demand is shaped by the balance between total investment and savings and fluctuates with changes in overall output and employment. A significant breakthrough occurred when economists established that total demand could be measured using a multiplier after adjusting some of its components. In Keynes' view, monetary policy alone is insufficient to sustain the investment needed for full economic employment due to obstacles in regulating interest rates. For example, attempts to lower interest rates might create investment gaps. As a result, Keynesian theory advocates for public expenditure as a necessary method to ensure full employment in a market economy (Keynes, 1936). At the same time, wage inflexibility is not capable of generating mass job creation. Therefore, Keynes concluded that sticky wages help stabilize the economy and limit inflation. Keynes suggested that in times of economic downturn and depression, a decline in the demand for goods and services causes unemployment and

therefore government intervention (such as fiscal stimulus) is needed to increase aggregate demand and restore employment (Davaajargal & Tsolmon, 2019).

Classical theory has evolved into new classical theory over time. While it retains the core elements of classical theory, it also incorporates aspects of Keynesian theory and other related economic research. Consequently, neoclassical concepts have emerged, such as the idea that the price of goods is determined by their value to consumers and that production decisions depend on the marginal product of additional labor. Neoclassical economists also highlight the importance of factors like human capital and technology in determining labor productivity and wages (Hudea, 2014). They argue that the labor market is efficient and that individuals' decisions to participate in the labor market depend on the returns from employment and the associated costs.

Theoretical perspectives on the relationship between employment and public investment

There are several theories that explain the relationship between employment and public investment. For example, the core idea of Keynesian employment theory is that budgetary investments stimulate aggregate demand, thereby increasing production and employment. Classical theories, which view long-term economic growth and employment as driven by capital accumulation (especially public capital), labor, and technological advancement, were explained in the previous subsection and will not be discussed here. Moreover, economic sectors are interrelated, and public investment in one sector affects others through the supply chain. This interconnection enables the impact of public investment on employment to be assessed by analyzing inputs and outputs. The Input-Output Theory (Leontief Model), which will be discussed in detail in the next subsection, is therefore not elaborated on here. Therefore, we will now explain several remaining theories, including Wagner's Law, Endogenous Growth Theory, and the Crowding-In vs. Crowding-Out effects between the two economic indicators.

As the economy develops, the demand for public services, goods, and infrastructure increases, which in turn leads to higher public investment. This growth in public investment generates greater labor demand across various sectors of the economy, including education, health, construction, and others. Observing this phenomenon, German economist Adolph Wagner proposed his law, which states that "government spending increases as national income rises" (Wagner et al., 1977). As industrialization progresses in a country, the share of the public sector in the economy also tends to expand. Wagner identified three main reasons for the rise in government expenditure: (i) the expansion of social activities undertaken by the government, (ii) the growth of administrative and defense responsibilities of the state, and (iii) the increased provision of social welfare. In any case, an increase in budgetary investment and public expenditure contributes to a rise in employment, including the number of public sector employees.

Public investment in human development, innovation, and related infrastructure serves as an internal driver of the economic system, supporting the national economy and promoting long-term sustainable growth. According to Endogenous Growth Theory, such investments, which strengthen the internal capacity of the economy, enhance labor productivity and employment sustainability. In other words, economic growth and the associated increase in job opportunities are believed to depend not on external factors, but rather on internal elements of the system and the enhancement of their productivity and capacity (Romer, 1994). These investments also contribute to the creation of new jobs in sectors characterized by high productivity and international competitiveness.

The next theory we considered is the Crowding-In vs. Crowding-Out effects theory. Public investment can support private sector investment and business activity, a phenomenon known as the crowding-in effect. Conversely, excessive public investment and government spending can reduce private sector activity and lead to higher interest rates or a scarcity of financial resources—this is referred to as the crowding-out effect. The overall impact on employment depends on whether the positive effects of public investment outweigh the negative ones(Aschauer, 1989).

Factors influencing employment levels

Employment is influenced by many factors, including economic growth, government policies, and educational attainment. Economic growth is often positively correlated with employment. However, the relationship between these two factors is not always straightforward. Many studies have shown that economic growth does not necessarily lead to increased employment. For example, the rise of automation and the expansion of capital-intensive economic sectors may reduce jobs or, at the very least, fail to create new ones. Additionally, research by Brynjolfsson and McAfee suggests that automation and artificial intelligence (AI) could eliminate certain jobs and contribute to structural unemployment (Brynjolfsson & McAfee, 2014). The theory of human capital, developed by scholars such as Gary Becker, posits that increased employment through education and skill development is important for reducing unemployment. Studies in this area show that higher levels of education lead to increased employment, and that educated, high-skilled workers are better able to adapt to changes in the labor market(Becker, 1965).

Input-output analysis

The diversification and fragmentation of production had to account for the distribution pattern of value-added between countries and companies, as well as the impact on the environment. Input-output analysis, which identifies the relationships between economic sectors and countries, reflects real production data and is an appropriate tool for answering questions such as, “Where did the added value come from?” and “What are the sources of carbon dioxide?” (Tegshjargal, Byambatsogt, & Tsolmon, 2022). This section outlines research on how input-output analysis is used to study the distribution of additional value to economic sectors and its impact on the environment.

The input-output analysis method was first proposed in the 17th century by the French economist and physicist François Quesnay, who created a chart showing the relationships between economic sectors. Two hundred fifteen years later, in 1974, Wassily Leontief was awarded the Nobel Prize for his work on the development of input-output analysis of economic sectors. Since then, the analysis has been regularly created and used in many countries around the world. As noted at the International Conference on Input-Output Analysis in the Netherlands in 1950 (Netherlands Economic Institute, 1953) and in Italy in 1954 (Barna, 1955), the method of input-output analysis began to develop rapidly in Western Europe in the early 1950s. In most countries, the national statistical offices prepared tables according to the method. The input-output analysis method was soon adopted in the socialist countries of Eastern Europe. In the National Accounting System, the production of goods was divided by economic sectors, and input-output tables showed their interdependencies (OECD, 2006). In addition to the United Kingdom and the United States, input-output analysis is now being thoroughly studied and used effectively in Japan, India, Germany, Austria, the Scandinavian countries, and the Netherlands (Akhabbar, Antille, Fontela, & Pulido, 2011).

For now, however, European economists are leading the research and implications of input-output analysis, while participation from Asian countries is growing. In 2007, the Istanbul Communication Conference concluded that about 26% of this type of research was conducted by Asian researchers, while two years later, according to the São Paulo Conference, they were responsible for 35.5% (Akhabbar, Antille, Fontela, & Pulido, 2011). In this regard, there is a trend toward a shift in the research and application of input-output analysis to Asia.

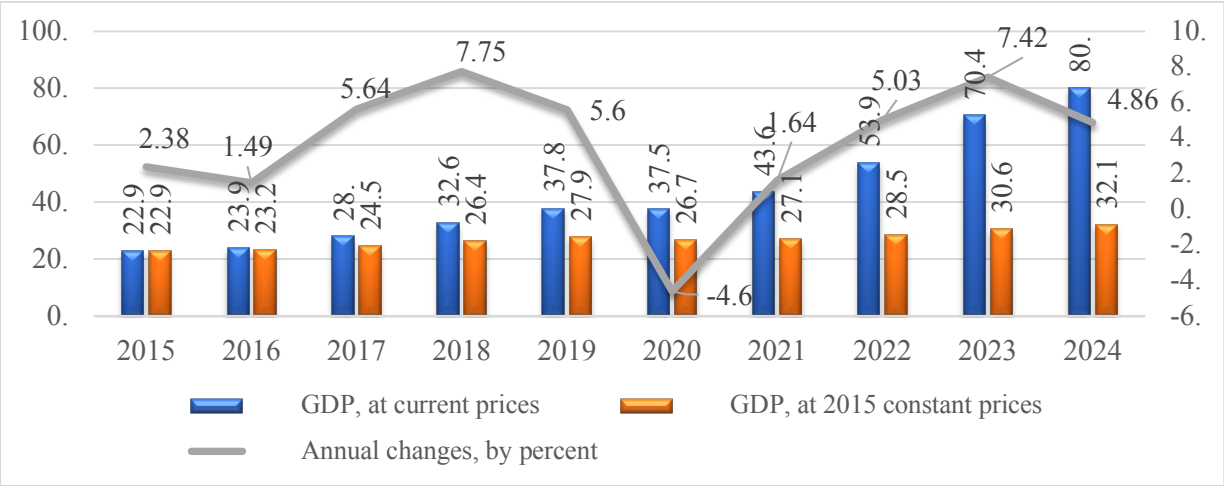
In 1963, Mongolia first conducted an input-output analysis. At that time, Mongolian researchers developed an intersectoral balance based on GDP data from 1966, 1970, 1977, 1983, and 1987, in accordance with the Intersectoral Balance Methodology of the Soviet Union, which was then used in all member countries of the Council for Mutual Economic Assistance. In 1997 and 2000, after the transition to a market economy, the intersectoral balance was estimated as part of the test implementation of the National Accounting System Methodology, which had been developed by international organizations. It was also estimated in 2005 under the National Accounting System-93 methodology. Additionally, in 2010, the balance was calculated based on the recommendations of the National Accounting System and the Methodology for Establishing Resource and Utilization Tables developed by Eurostat. Since 2010, the National Statistical Office of Mongolia has estimated resource and utilization tables and the intersectoral balance annually, with 4, 20, 32, 48, and 55 economic sectors (Tegshjargal, 2016).

We decided to conduct the research based on the assumption that it is possible to estimate which sectors of the economy are likely to create more jobs as a result of investment using input-output analysis.

The current situation of the Mongolian economy, public investment and employment

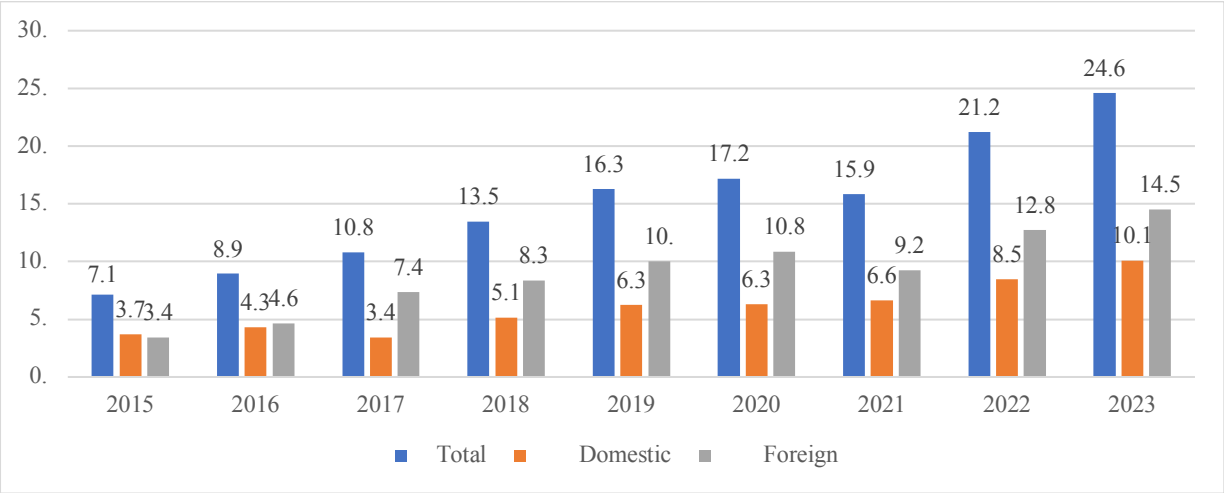
As you can see in the figure below, the economy of Mongolia has grown significantly over the past 10 years. In 2020, the country's economy downsized by 4.6 percent compared to the previous year's GDP due to the global Covid-19 pandemic. The economy had grown by 7.75 percent in 2018, showing the highest growth during the ten-year period. The Mongolian economy has shown a relative recovery over the past 4 years, growing between 1.64 and 7.42 percent, due to higher demand and prices for raw materials such as copper, coal, and gold.

Figure 1: Nominal and Real GDP data of Mongolia, trillion MNT



Source: National Statistical Office of Mongolia

Figure 2: Total investment, by source, trillion MNT



Source: National Statistical Office of Mongolia

According to the National Statistical Office of Mongolia, from 2015 to 2023, Mongolia's total investment increased by 3.5 times, from 7.1 trillion MNT to 24.6 trillion MNT. During the same period, domestic investment increased 2.7 times, from 3.7 trillion MNT to 10.1 trillion MNT, while foreign direct investment increased 4.3 times. As a consequence of the Covid-19 pandemic, in 2021, Mongolia's total investment fell by 7.5 percent compared to the previous year. However, total investment showed a rapid recovery, reaching a 33.8 percent growth rate in the following year, 2022, the highest in the past 9 years.

Table 1: Total labor force, employed or unemployed

Indicator	2015	2016	2017	2018	2019	2020	2021	2022	2023
Total labor force	1,243,895	1,275,650	1,357,425	1,358,637	1,362,472	1,340,014	1,317,425	1,370,594	1,367,319
Employed	1,151,223	1,147,843	1,238,333	1,253,023	1,227,949	1,249,643	1,207,991	1,283,128	1,294,746
Unemployed	92,672	127,807	119,092	105,614	134,523	90,371	109,434	87,466	72,573

Source: National Statistical Office of Mongolia

From 2015 to 2023, Mongolia's labor force grew from 1,243,895 to 1,367,319, an increase of 123,000 people, or 9.9 percent. On the other hand, the number of unemployed people rose by 143,000, or 12.5 percent, while the number of registered unemployed citizens decreased from 92,000 to 72,000, a decline of 21.7 percent over the same period. Mongolia's working-age population is growing because the birth rate exceeds the death rate. However, due to insufficient investment in key economic sectors, the country is lagging behind in technology, and productivity is declining. As a result of these negative indicators, real wages are continuously declining. Therefore, by properly assessing which economic sectors are more profitable and can create more jobs, and by investing more in these sectors, the technology gap will be reduced, and both productivity and wages will increase.

Estimation results

In this part of the research, we aim to study the impact of investment on employment using input-output analysis methods and prioritize economic sectors based on the additional

job creation resulting from investment. In today's economic situation, where the poverty rate is not declining significantly, there is a need to increase investment in sectors of the economy that generate more jobs.

Input-output analysis methodology

Input-output analysis has been developed as a method of analyzing a country's manufacturing, consumption, and an interdependence between economic sectors. Core idea of input-factor analysis is the use of linear equations to determine the interdependence of economic sectors. The coefficients of the input-output equations are calculated using the input-output table (European Comission, IMF, OECD, UN & World Bank, 2008)

	Intermediate Consumption				
	Agriculture	Manufacturing	Services	**Final Demand**	**Total Output**
Agriculture	z_{11}	z_{12}	z_{13}	y_1	x_1
Manufacturing	z_{21}	z_{22}	z_{23}	y_2	x_2
Services	z_{31}	z_{32}	z_{33}	y_3	x_3
Value Added	v_1	v_2	v_3		

Figure 3. An input-output table for a hypothetical, 3 sector economy

Source: (Mair & Druckman, 2023)

Since each row represents the output of a particular economic sector, the general equation can be written as follows:

$$x_i = z_1 + z_2 + \cdots + z_i + y_i$$

Here, z_{ij} represents the total input from the *i*-th economic sector into the *j*-th economic sector. y_i expresses the amount of final goods produced by the *i*-th economic sector, while x_i shows the gross output of the *i*-th economic sector.

If we express the system of equations for the gross output of the economic sectors in matrix form, we obtain the following form:

$$\mathbf{x = Z_i + y}$$

$$x = \lfloor x_1\ x_2\ \vdots\ x_i \rfloor;\ Z_i = \lfloor z_{11}\ z_{12}\ \cdots\ z_{1j}\ z_{21}\ z_{22}\ \cdots\ z_{2j}\ \vdots\ z_{i1}\ \vdots\ z_{i2}\ \ddots\ \vdots\ \cdots\ z_{ij} \rfloor;\ y = \lfloor y_1\ y_2\ \vdots\ y_i \rfloor$$

To solve the matrix equation, we use the following technical coefficients matrix and the identity matrix:

$$A = \lfloor a_{11}\ a_{12}\ \cdots\ a_{1j}\ a_{21}\ a_{22}\ \cdots\ a_{2j}\ \vdots\ a_{i1}\ \vdots\ a_{i2}\ \ddots\ \vdots\ \cdots\ a_{ij} \rfloor;\ I = \lfloor 1\ 0\ \cdots\ 0\ 0\ 1\ \cdots\ 0\ \vdots\ 0\ \vdots\ 0\ \ddots\ \vdots\ \cdots\ 1 \rfloor$$

Here, $a_{ij} = \frac{z_{ij}}{x_i}$ represents the technical coefficients. From here, if we write the matrix for the final demand equation using technical coefficients and the gross production of economic sectors, it will look as follows:

$$\mathbf{y = (I - A)x}$$

From the above equation, if we find the gross output of the economic sectors, we obtain the following equations:

$$\mathbf{x = (I - A)^{-1}y}$$

Here, $\mathbf{(I - A)^{-1}}$ is called the Leontief matrix, and inverse matrix of **(I – A)** matrix and it shows how the input for each economic sector and the sectors' gross output will change if the final demand changes.

To calculate the employment multiplier, we first determine how much labor is being used to create one unit of production in economic sectors. The formula can be written as follows:

$$l_i = \frac{L_i}{x_i}$$

To calculate how many jobs will be created in the investment sector and other economic sectors as a result of some additional investment, we need to multiply the above ratio by the coefficients $(I - A)^{-1}$.

$$\text{Jobs}_{ij} = \mathbf{(I - A)^{-1}} l_i$$

Using this formula, it is possible to calculate the number of jobs that will be created in investment sector and in other sectors as a result of investment in a particular sector of the economy.

Research data

Data on the 20x20 sectoral balance of Mongolia from 2016 to 2019, as well as information on employment in economic sectors used in the research, were taken from the statistical database on the www.1212.mn website of the National Statistical Office of Mongolia.

Table 2: 20x20 sectoral balance data for 2019, by million MNT

	S1	S2	S3	S4	S5	S6	…	S19	S20
S1	472751.5	3738.1	2893149.0	444.3	5871.1	5730.6	…	1226.2	0
S2	4556.2	1232580.0	117657.5	277995.7	2867.2	144805.9	…	1287.7	0
S3	116678.4	342021.7	929607.1	12303.2	2996.8	627296.2	…	36041.3	0
S4	22341.1	264197.5	206338.1	931769.4	53033.4	173148.1	…	18284.8	0
S5	31782.3	24113.4	19736.9	81285.4	29576.6	28001.8	…	1804.5	0
S6	107355.7	830767.7	7820.8	8229.5	2818.5	505078.3	…	23555.6	0
S7	170208.0	509128.6	679800.0	23590.2	7027.8	522194.4	…	16660.2	0
S8	112148.5	735529.1	67336.4	21008.6	5973.5	247174.8	…	9505.0	0
S9	755.7	150413.3	14013.9	991.0	1311.0	21137.1	…	1292.5	0
S10	7668.1	149821.6	56982.0	2996.3	551.3	95953.7	…	13323.6	0
S11	294189.5	303162.7	98099.5	2168.2	16368.4	376043.8	…	1397.4	0

S12	9555.5	98936.3	39969.4	98.6	903.6	8846.8	…	25458.8	0
S13	37150.9	190233.7	12435.3	432.0	231.6	94098.7	…	28438.9	0
S14	73405.8	83242.3	22429.9	692.6	16998.1	24938.2	…	4397.8	0
S15	12170.4	18414.4	13383.4	127.8	3694.6	5788.8	…	751.2	0
S16	75.9	3940.4	950.4	337.9	148.8	1287.5	…	983.9	0
S17	3.1	11395.7	7288.2	37.3	39.3	14281.8	…	1888.5	0
S18	3.3	6123.8	313.3	89.0	10.4	326.6	…	1826.4	0
S19	6106.3	36128.5	7095.6	544.1	140.5	4239.9	…	5311.8	0
S20	0	0	0	0	0	0	…	0	0

Source: National Statistical Office of Mongolia

The GDP data in a row show the value of goods and services produced by a specific economic sector, which are used as production inputs across a total of 20 sectors in the economy. In 2019, the mining and exploration sector accounted for 26.1% of Mongolia's GDP, the manufacturing sector accounted for 13.2%, the "Wholesale and Retail Trade, Repair, and Service of Cars and Motorcycles" sector accounted for 8.5%, and the "Agriculture, Forestry, Fishing, and Hunting" sector accounted for 9.1%. Employment data for economic sectors will be introduced in the next estimation section.

The estimation results

First, we calculated the investment multiplier using the methodology outlined in the input-output analysis section above. To achieve this, we estimate the coefficients of matrix A from the manufacturing resource table shown in Table 2. The A matrix represents the amount of input each economic sector receives from its own sector and from other sectors to produce its products and services. Next, we find the inverse of the matrix (I−A), where the coefficients of matrix A are subtracted from the identity matrix respectively. The resulting inverse matrix represents the investment multiplier.

Table 3: Investment multiplier coefficients

Code	Economic sectors	Direct impact	Indirect impact	Total impact
ES1	Agriculture, forestry, fishing and hunting	1.09	0.71	1.8
ES2	Mining and quarrying	1.08	0.44	1.51
ES3	Manufacturing	1.12	0.88	2
ES4	Electricity, gas, steam, air conditioning supply	1.59	1.25	2.83
ES5	Water supply; sewerage, waste management and remediation activities	1.08	0.18	1.26
ES6	Construction	1.09	0.6	1.69
ES7	Wholesale and retail trade; repair of motor vehicles and motorcycles	1.04	0.87	1.91
ES8	Transportation and storage	1.08	0.59	1.66
ES9	Accommodation and food service activities	1	0.12	1.12
ES10	Information and communication	1.1	0.36	1.46
ES11	Financial and insurance activities	1.05	0.56	1.6
ES12	Real estate activities	1.01	0.4	1.41
ES13	Professional, scientific and technical activities	1.03	0.31	1.34
ES14	Administrative and support service activities	1.08	0.25	1.33

ES15	Public administration and defence; compulsory social insurance	1	0.09	1.09
ES16	Education services	1.01	0.02	1.03
ES17	Human health and social work activities	1	0.02	1.02
ES18	Arts, entertainment and recreation	1	0.02	1.03
ES19	Other service activities	1.01	0.05	1.07
ES20	Taxes less subsidies on products	1	0	1

Sourcre: Estimation of the researchers

The sectors with the highest return on investment are the "Electricity, gas, steam, and air conditioning supply" sector with a coefficient of 2.83, the "Manufacturing" sector with a coefficient of 2.0, the "Wholesale and retail trade, repair of motor vehicles and motorcycles" sector with a coefficient of 1.91, and the "Agriculture, forestry, fishing, and hunting" sector with a coefficient of 1.8. The investment multiplier indicates that each unit of investment in these economic sectors will be multiplied by their respective coefficients.

Table 4: Empolyment coefficients

Economic sector	Employees aged 15 years and older	GDP	Employment coefficient
Agriculture, forestry, fishing and hunting	290160	6587141.5	0.044049
Mining and quarrying	57923	18832929.9	0.003076
Manufacturing	90378	9525714.8	0.009488
Electricity, gas, steam, air conditioning supply	19348	2574688.7	0.007515
Water supply; sewerage, waste management and remediation activities	10786	423441.5	0.025472
Construction	68847	6967585.9	0.009881
Wholesale and retail trade; repair of motor vehicles and motorcycles	160405	6110836.0	0.026249
Transportation and storage	61123	4751516.1	0.012864
Accommodation and food service activities	36280	1101023.8	0.032951
Information and communication	13019	1689813.1	0.007704
Financial and insurance activities	24257	2342435.3	0.010355
Real estate activities	1154	2478060.5	0.000466
Professional, scientific and technical activities	18031	1213771.7	0.014855
Administrative and support service activities	20163	801924.3	0.025143
Public administration and defence; compulsory social insurance	85965	2818060.3	0.030505
Education services	96108	2035298.6	0.047221
Human health and social work activities	44376	1329550.4	0.033377
Arts, entertainment and recreation	17999	221101.8	0.081406
Other service activities	26561	455189.2	0.058352
Taxes less subsidies on products	3275	2947.9	1.11096

Source: National Statistical Office & Estimation of the researchers

We can determine the Leontief matrix or the employment multiplier by multiplying the employment coefficients calculated in Table 4 by the inverse matrix of the (I-A) matrix. We have estimated the number of jobs, both direct and indirect, that would be created by an investment of $1 billion in each sector of the economy. The results of this estimation are shown in Appendix 1. As a result of the investment of 1 billion MNT to economic sectors equally, the "Arts, entertainment, and recreation" sector leads with the creation of 84 new jobs, followed by the "Agriculture, forestry, fishing, and hunting" sector with 79 new jobs, and the "Other service activities" sector with 69 new jobs. In contrast, the "Mining and quarrying" sector generates only 4 new jobs, and the "Real estate activities" sector creates no new jobs in 2019, showing the lag in job creation.

Conclusion and Discussions

The purpose of this research is to estimate the impact of public investment on employment across various economic sectors and to prioritize these sectors based on their potential for job creation. As mentioned in the introduction, we propose two hypotheses: (1) public investment in the agriculture, forestry, fishing, and hunting sector—which is the most labor-intensive sector—has a significantly greater impact on employment generation compared to other economic sectors in Mongolia; and (2) sectors with high GDP contributions, such as mining and real estate, do not necessarily generate proportionately high employment as a result of public investment. The study employs the input-output analysis method developed by Nobel Prize-winning economist Wassily Leontief to estimate the number of jobs created in each economic sector as total demand or public investment increases in a particular sector, thereby testing the hypotheses. The estimations are based on the production resource tables provided by the National Statistical Office of Mongolia, along with data on gross domestic product and employment across economic sectors.

According to the research results, if equal investments were allocated across 20 economic sectors in Mongolia, the "Agriculture, Forestry, Fisheries, and Hunting" sector would generate the highest number of jobs—79 new jobs per 1 billion MNT investment—compared to all other sectors, except for the "Arts, Entertainment, and Recreation" sector. In contrast, the "Mining and Quarrying" and "Real Estate Activities" sectors would create the fewest jobs, with only 4 and 0 new jobs per 1 billion MNT investment, respectively. Based on these estimation results, both hypotheses are supported. In Mongolia, the current boom in the mining and real estate sectors—which attract a larger share of investment—may be a key factor contributing to the persistence of poverty and the significant disparities in well-being and income. Therefore, increasing public investment in the 'Agriculture, Forestry, Fisheries, and Hunting' sector and creating productive jobs—many of which could involve goods tradable in foreign markets—presents an opportunity to reduce poverty and promote social development.

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Appendix 1. Employment impacts of investment in economic sectors

Direct impact (Job creation in own economic sector)																			
	ES1	ES2	ES3	ES4	ES5	ES6	ES7	ES8	ES9	ES10	ES11	ES12	ES13	ES14	ES15	ES16	ES17	ES18	ES19
2019	48	3	11	12	28	11	27	14	33	8	11	0	15	27	31	48	33	82	59
Indirect impact (Job creation in other economic sectors)																			
	ES1	ES2	ES3	ES4	ES5	ES6	ES7	ES8	ES9	ES10	ES11	ES12	ES13	ES14	ES15	ES16	ES17	ES18	ES19
2019	31	1	8	9	5	6	23	8	4	3	6	0	5	6	3	1	1	2	3
Total impact (Job creation in whole economy)																			
	ES1	ES2	ES3	ES4	ES5	ES6	ES7	ES8	ES9	ES10	ES11	ES12	ES13	ES14	ES15	ES16	ES17	ES18	ES19
2019	79	4	19	21	33	17	50	22	37	11	17	0	20	33	34	49	34	84	62

Source: Estimation of the researchers

Factors Affecting Career Choice: An Interdisciplinary Approach of Educational Studies and Consumer Behavior Research

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Abstract. Undergraduate enrollment in universities across Mongolia has experienced troubling fluctuations in recent years. According to the National Statistics Office, university enrollment in Mongolia declined by 7.2 percent from 2022, resulting in a low of 26.3 thousand students. Higher Education Institutions (HEIs) have also seen a decrease in freshmen enrollment, leading many leaders to focus on ensuring the sustainability of these institutions. On the one hand, this is a characteristic of the behavior of adolescents. This paper proposes a two-fold study: (1) to identify the factors influencing Mongolian high school students' choices of HEIs and academic degree programs, and (2) to explore the factors affecting behavioral intentions. A web-based questionnaire was used to collect data from a sample of 707 senior high school students in Mongolia who participated in an online survey. The survey aimed to examine the influence of various factors, including university characteristics, the impact of significant individuals, student characteristics on students' decision to enroll in HEIs. The findings from structural equation modeling indicate that student characteristics significantly influence students' decision to enroll university. In conclusion, this study highlights the model's effectiveness in understanding the factors that influence students' decisions to enroll in university. The results also provide managerial implications to enhance institutional student recruitment strategies.

Keywords: *High school graduates; HEIs; education; consumer behavior, interdisciplinary research*

Introduction

Choosing the right career is a significant issue that can positively impact the development of individuals, families, organizations, sectors, and the nation. In our country, providing vocational guidance, assistance, and support to secondary school students in their career choices is just the beginning. It is important to note that non-governmental organizations have conducted research in this area, published guides detailing the benefits of selecting the right career and the drawbacks of making poor choices, and organized training programs over a designated period.

In many European countries, such as France, the Netherlands, Scotland, England, Sweden, Finland, Norway, and Denmark, students begin making career choices starting in the 7th grade. In Japan, however, career selection begins as early as elementary school (Н.Цогцолмаа).

Choosing a career is a significant step for graduating students. In recent years, a comprehensive information platform has emerged in Mongolia, offering valuable insights regarding job opportunities, potential earnings, and educational pathways for students pursuing their desired professions. This development has greatly enhanced the support available to students in making informed career choices.

In response to modern social changes and developments, the desire of people to study, work, and live abroad has significantly increased. Sociological research indicates that 48% of university students wish to work and live abroad (Г.Пүрэвсүрэн).

There is a lack of research on high school students in Mongolia regarding their choices of universities and the majors they wish to pursue. This study was conducted to determine whether factors such as students' characteristics and the reputation of the university influence their career choices utilize the stimulus-organism-response (S-O-R) model to explain the intention to enroll in universities. This model has been widely applied to analyze user behavior in various fields (Rocky Nagoya, 2021). According to the S-O-R framework, perceived environmental cues (stimuli) can trigger an individual's internal judgment (organism), leading to either positive or negative behaviors (responses) (Mehrabian and Russell, 1974). In this research, the stimuli are the university related factors including image, quality, and facilities, which the institution actively shapes. The organism, in this context, refers to the attitudes formed by the stimuli, which include personal factors. The response reflects the outcomes of the organism's processes, specifically students to enroll decistion to the university. While many studies have employed the S-O-R model, none have done so within the context of this particular research. Therefore, this study is significant as it aims to enhance our understanding of the processes behind the decision to enroll in universities.

Literature review and Hypotheses

The stimulus-organism-response (S-O-R) model, initially developed in psychology, has been widely applied across various fields, including education. This model explains how environmental factors (stimuli) influence an individual's internal state (organism), ultimately leading to specific behavioral responses (Pan et al., 2024). According to Mehrabian and Russell (1974), individuals react to stimuli based on their internal cognitive and emotional states. The model illustrates how external environmental cues can shape and reinforce these internal processes. In the context of education, the S-O-R model provides a structured framework for understanding how environmental stimuli impact person's internal experiences, which subsequently drive their behavioral outcomes.

Stimuli from the environment influence an individual's cognitive or emotional experiences, resulting in behavioral responses after a series of internal psychological activities. In their research, Mehrabian and Russell (1974) focus specifically on emotional responses.

Pan et al. (2024) expand on the S-O-R model by suggesting that students (the 'organism') experience various emotions such as motivation, engagement, frustration, or satisfaction, which can lead to positive or negative customer experiences through cognitive and affective processes. Previous studies indicate that attitude aspect play a role in the S-O-R framework. Psychologists define attitudes as learned tendencies to evaluate and judge things in a specific way. This evaluation can apply to people, issues, objects, or policies (Cherry, 2024). The term encompasses our opinions, emotions, perceptions, beliefs, expectations, values, and intentions (Bagozzi, 1994). In our study, we include students' characteristics as a key component of our

research model. Specifically, we use the term "students' characteristics" to support the proposition that both university characteristics and influence of significant people enhance students' perceptions of their expectations regarding the university. Individuals who have a positive perception of their university characteristics and influence of significant people are likely to develop more favorable personal attitudes. According to the S-O-R paradigm, students' characteristics act as an organism influenced by these university characteristics and influence of significant people, which ultimately impact their decision to enroll the university.

There have been prior studies that utilize S-O-R model in the context of education. For example, Nagoya et al. (2021) applied S-O-R model to investigate how factors such as university quality and image (stimulu) influence cognitive attitude, affective attitude (organism), and ultimately intention to enrol at a university (response). Another study conducted by Pan et al. (2024) adopted the S-O-R model to examine the relationship online learning interactions and its outcomes with internal cognitive processess for perceived usefullness and perceived ease of use and students in influencing their learning outcome with a uniersity setting. Nguyen et al (2022) stated that before enrolling in a university, students will begin to research information and lead to an intention to choose the university that they will attend. Universities are selected based on students' and parents' criteria about personal ability, ability to complete programs, and employment after graduation.

In particular, it suggests that student's decision for enrollment for university is influenced by student characteristics and two external factors: fixed university characteristics and the influence of significant people with prospective students. In the present study, these factors are included by two predictor variables (i.e., university image, perceived program quality, and perceived career opportunities) as informed by the literature review while the endogenous variable is modified with the decision to enroll in university to suit the research aim. The subsequent section discusses the original and the three added predictor or endogenous variables as antecedents of the modified dependent or exogenous variable.

On the bases of these theoretical supports, this study hypothesizes that:

H1: University characteristics positively and significantly influence significant people
H2: University characteristics positively and significantly influence students' characteristics
H3: Significant people positively and significantly influence students' characteristics
H4: Student characteristics positively and significantly influence students' decision to enroll university

Method

Research Design

The scales are designed based on Cortes et al (2023)'s study and further literature review, three constructs were determined to influence decision to enroll in university. These constructs are (1) university characteristics, (2) influence of significant people, and (3) student characteristics. These constructs were operationalized through conducting a dedicated literature review to develop the items. University characteristics were measured by twelve items, and influence of significant people is measured by five items referenced from Cortes et al (2023). Student characteristics is measure by seven items referenced from Abubakar (2017). And the decision to enroll a university is measured by four items referenced from Abubakar (2017). The study uses a 5-point Likert scale with 1- strongly disagree; 5- strongly agree. Data were collected for 11th and 12th grade students from secondary schools of the Mongolia. Because this is an audience that has just need to choose through the university choice process, they will have the closest perception and assessment of the decistion to enroll a university.

The questionnaire was collected from October 2024 to January 2025 through Google Form to administer a web-based survey. Then, the link of the survey form was sent via email and different social media or messaging platforms.

Data

The number of respondents was 707 high school students. With respect to the respondents' demographic information, female respondents account for 51.0 percent and male were 49.0 percent. More than 84.9 percent were enrolled in public school followed by private schools as many as 107 respondents (15.1 percent). The most student were lived in Ulaanbaatar city (77.1 percent). The majority of the respondents were 12th grade students (66.5 percent). The households' monthly income were between MNT 1.5 million to MNT 6.0 million (65.6 percent) These results can be seen in the following table 1:

Table 1. Participants' socio-demographic profiles (n = 707)

Indicators	Category	Frequency	Percent (%)
Gender	Male	361	51
	Female	346	49
Type of secondary school	Public school	600	84.9
	Private school	107	15.1
Area of residense	Ulaanbaatar city	545	77.1
	Rural area	162	22.9
Grade level	12th grade	470	66.5
	11th grade	237	33.5
Households' monthly income	Up to MNT 1,500,000	113	16.0
	MNT 1,500,001-3,000,000	160	22.6
	MNT 3,000,001-4,500,000	159	22.5
	MNT 4,500,001-6,000,000	145	20.5
	More than MNT 6,000,001	73	10.3

Data analysis

Following Anderson and Gerbing (1988) two-step approach, we performed Confirmatory Factor Analysis (CFA) on the conceptual model to assess the adequacy of all the constructs, and SEM was used to estimate the model fitness and to test for causal relationships. The fit of the conceptual models to the empirical data is assessed with the chi-squared (χ) statistics, the goodness-of-fit index (GFI), the normed fit index (NFI), the comparative fit index (CFI), and the root mean square of approximation (RMSEA). For each of these statistics, values of 0.9 or higher indicate acceptability, except for the RMSEA, for which values up to 0.08 indicate an acceptable fit to the data (Hair et al., 2006).

Results

The means, standard deviations, internal consistencies (Cronbach's a coefficients) and zero-order correlations among the study variables are in Table 2. The a values for all the scales were greater than 0.70, indicating reasonable to good reliability (Hair et al., 2006).

Measurement model

We conducted CFA to check the convergent validity of the constructs in our measurement model and assessed model adequacy using fit indices (Hair et al., 2006). Following Hair et al.'s (2006) criteria, items with the factor loading lower than 0.50 should be deleted to fit the validity requirement. None items were thus removed from the scale. The final measurement model assessed university characteristics (twelve items), influence of significant people (five items), students' characteristics (seven items), and decision to enroll (four items).

The convergent validity of the CFA results has to be supported by item reliability, construct reliability (CR), and average variance extracted (AVE). Table 2 shows the results of CFA for the measurement model. The factor loadings of all the items met the minimum criterion of 0.5 and their cronbach alphas are above 0.91. The CR estimates range from 0.82 to 0.98, exceeding the critical value of 0.7, suggested by Hair et al. (2006). The AVE lies between 0.65 and 0.87, also well above the value of 0.5, suggested by Fornell and Larcker (1981).

According to the goodness-of-fit indices from the CFA results, the measurement model was deemed as parsimonious (Table 2). Specifically, though the chi-square statistic (χ= 1500, d.f. = 365) was significant, the ratio of the chi-square to the degrees of freedom (χ/d.f. = 4.1). Other indices, such as CFI (0.91), NFI (0.92), and GFI (0.88), were greater than the recommended values. The RMSEA of 0.04 was within the acceptable range of the recommended values (Hair et al., 2006).

Table 2. CFA results of the measurement model

Variables	Indicators	Factor loading	KMO	Cronbah alpha	CR	AVE
University characteristics	12 items	0.74-0.93	0.97	0.98	0.98	0.81
Influence of significant people	5 items	0.85-0.91	0.87	0.93	0.95	0.79
Students' characteristics	7 items	0.72-0.84	0.92	0.91	0.82	0.65
Decision to enroll	4 items	0.89-0.96	0.85	0.95	0.96	0.87

We assessed discriminant validity by comparing the AVE of each individual construct with the shared variances between it and all other constructs. A higher AVE of the individual construct compared with the shared variances suggested discriminant validity. The square root of the AVE for each construct was greater than the correlation coefficients of the corresponding inter-constructs (see Table 3), indicating discriminant validity (Fornell and Larcker, 1981).

Table 3. Discriminant validity

	Constructs	1	2	3	4
1	University characteristics	0.81			
2	Influence of significant people	-0.10**	0.85		
3	Students' characteristics	-0.11**	0.52**	0.82	
4	Decision to enroll	0.06**	0.63**	0.62**	

Note: ** $p < 0.010$
*** $p < 0.001$

Structural model and hypotheses testing

A maximum likelihood estimation of the structural model tested the predicted relationships among the constructs of the proposed conceptual model. The results presents the estimated model with the standardized path coefficients. The fit indices are summarized as follows: χ^2 = 1210.2 (p= 0.00), df =306, χ^2/df = 3.96, CFI = 0.92, GFI = 0.92, IFI = 0.93, and RMSEA = 0.040. All indicators meet the thresholds recommended by the previous literature, suggesting that the hypothesized model is well fitted with the empirical data (Fornell and Larcker, 1981).

The results partially support the hypotheses. University characteristics were found to be positively and significantly related to influence of significant people (γ = 0.69, t = 25.2), but it was not posivite and significant effect on students characterestics (γ = 0.09, t = 1.88). Thus, supported H1, but not supported H2. Influence of significant people was posively and significantly related to students characterestics (γ = 0.29, t = 5.98). Thus H3 are supported. Students characterestics is positively associated with decision to enroll university (γ = 0.29, t = 8.24) and thus H4 is supported.

Conclusion and Implication

This study has answered the research objective set out. First, the study has systematized the theory of the S-O-R model to increase the decision to enroll in a university. Second, the study has built a research model and research hypotheses about the relationship between stimuli, organisms, and responses. The survey research on 707 secondary school students has once again confirmed the importance of university characteristics, the influence of significant people, student characteristics, and the decision to enroll in university. The study answered the following objectives: (1) university characteristics have a positive effect on the influence of significant people but not effect on student characteristics; (2) the influence of significant people has a positive effect on student characteristics; (3) student characteristics has a positive effect on the decision to enroll the university. At the same time, research has shown that the important participatory university selection comes from the information factors that the university provides. These signals will help students have a lot of information needed to choose a university. From the results of this study, the authors also give some implications to help improve the decision to enroll in the university.

The results of this study demonstrate how the decision to enroll in a university is influenced by external stimuli (such as university characteristics and the influence of significant people) and internal factors (including the students characteristics) in the Stimulus-Organism-Response (S-O-R) model. These findings can help increase enrollment decisions by suggesting the following strategies: First, improve the university's reputation, and overall image by establishing high educational standards and employing qualified teaching staff. Additionally, improving university rankings can assist prospective students in their decision-making, as these rankings often indicate the quality of education offered. Second, enhance communication with stakeholders about the university's successes and initiatives using effective marketing strategies or information campaigns. Thrid, create programs that facilitate quick job placements for graduates, offer attractive career prospects, maintain reasonable tuition fees, and provide good value for money. Overall, implementing these strategies can significantly increase the likelihood of students choosing to enroll at a university.

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MEASURING FINANCIAL REPORTING QUALITY IN PUBLIC SECTOR INSTITUTIONS: CENTRAL REGION PROVINCES, MONGOLIA

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Abstract. In recent years, considerable research has been conducted in our country on the quality of financial statements and earnings management among listed companies. However, there remains a significant gap in the literature concerning the evaluation of financial reporting quality (FRQ) within government public sector organisations. This study aimed to assess the financial reporting quality (FRQ) of public sector institutions in six provinces of the central region—Darkhan-Uul, Dornogovi, Umnugovi, Govisumber, Dundgovi, and Selenge—and to identify the factors influencing it. The analysis was based on the financial performance of 676 organizations that met the eligibility criteria, selected from a total of 1,495 organizations. Data were obtained from audit reports published on the website of the National Audit Office for the fiscal years 2023–2024 and analysed using SPSS version 25. aaBudget realization ratio (REAL) differed statistically, depending on the type of audit opinion received by the Mongolian national audit office ($p<0.001$). There were no significant variables found in the study of the impact on the FRQ. This research adds to the existing literature on financial reporting quality by offering empirical insights into its determinants within the public sector—an area that has received comparatively limited scholarly attention. This study used the audit opinion included in the financial statements and did not examine the accuracy of the audit opinion.

Keywords: *Financial statements quality, capital expenditure, financial Independence, budget realization ratio, financial incentives.*

Introduction

Recently, there has been a trend towards qualitative and quantitative studies in the definition of FRQ in many countries. Qualitative characteristics of financial statements include indicators such as clarity, relevance, credibility, and parallelism, while quantitative indicators consider financial relationship and structural analysis. Funding and expenditure of the public sector differ from that of the private sector in that it is regulated within the framework of the budget. Budget Relationship in This Sector The "Budget Law," which was revised in December 2011,

regulates the relationship between the budget and its composition, budget preparation, approval, spending, registration, reporting, and monitoring. (law, 2011)

Qualified financial reporting is important to evaluate the effectiveness of budget management. According to the survey, Mongolia's budget performance is lower than expected. The National Audit Office said that there is a need for a detailed analysis of the budget coordination between the budget manager, the implementation of the budget for the current year, and the reasons and consequences of the under-budgeted spending. (Davaakhuu, 2023)

Stakeholders of financial statements from industry units and organizations have greater confidence in reports that are verified or audited. The executive management of an industry unit or organization and the chief accountant are required to sign and stamp the financial statements, and the executive management is required to ensure the accuracy of the financial statements. (law, 2015)

Recently, consumers of financial statements have been paying a lot of attention to the issue of quality of financial statements (FRQs).(Stanley, 2007) Other studies have shown that key factors such as audit quality, capital structure, business alignment, quality of employees, reputation of the company, and reporting incentives have a significant impact on financial performance.(Rahman,2010) However, little research has been done on the factors affecting FRQs, especially in the public sector.(Call, 2017), (Cao, 2012),(Christensen, 2015)

Because the financial reporting kits, reporting elements, and legal environment for reporting and accounting standards and procedures for a publicly funded organization differ significantly from those in the private sector, there are differences in how FRQs are measured. Therefore, in order to determine the FRQ of the public sector sector, we set out to conduct a survey based on the 2023-2024 audit reports of 676 institutions under the Budget direct administrator.

Analysis of the quality of financial statements of organizations within the direct control of the budget of the Central Region Provinces.
This is because the central region accounted for 23.8% after Ulaanbaatar in terms of the local budget for 2023-2024. This study aimed to assess the financial reporting quality (FRQ) of public sector institutions in six provinces of the central region—Darkhan-Uul, Dornogovi, Umnugovi, Govisumber, Dundgovi, and Selenge—and to identify the factors influencing it.

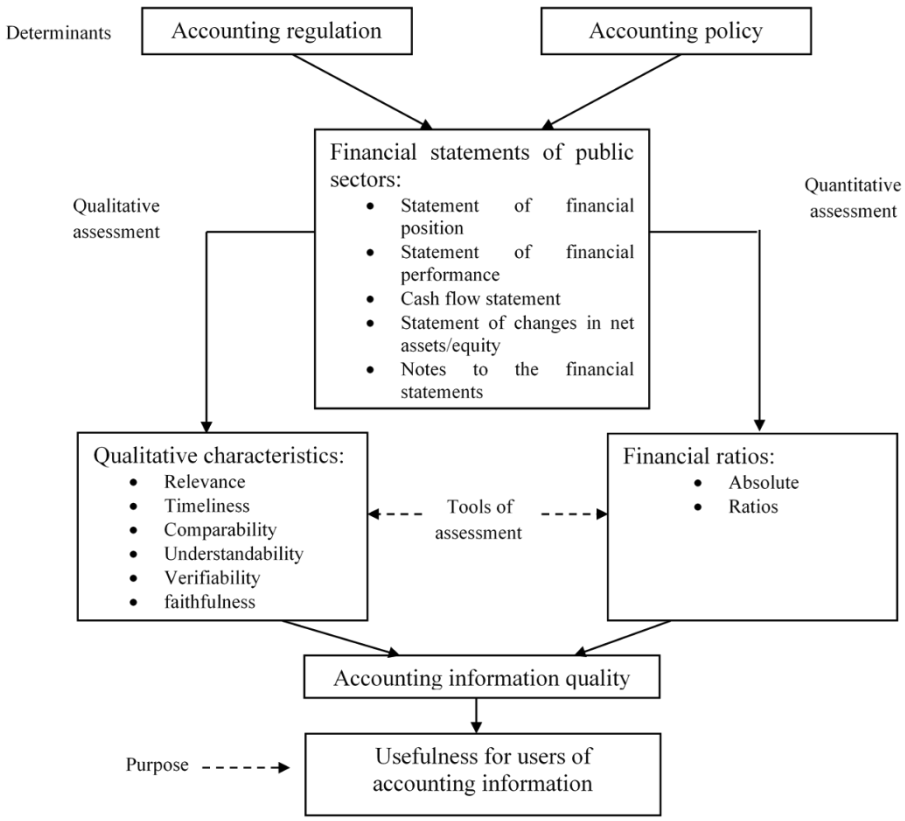
Literature review

The accounting records of public sector institutions shall be maintained in accordance with the Accounting Procedures and the Accounting Procedures of the Third Party and the IPSAS. For the approved budget institutions, a Budget Performance Report shall be prepared, in which the results of the report shall be presented in parallel with the approved budget information. (Accounting Regulations for Budgetary Organizations, 2023)
The State Audit Office audits and verifies that its financial statements are presented in an accurate and fair manner in accordance with the requirements of applicable legislation, standards, administrative regulations, and other legal acts. There are 4 types of reviews.

- Disclaimer of opinion
- Adverse opinion
- Qualified opinion
- Unmodified

The quality of audited reports can be measured in terms of numbers and quality indicators. The study Quality of Financial Reporting in the Public Sector (Kristina Rudzioniane and Toma Jouzapaiciute) defines the quality of financial reporting in public sector institutions as possible using the following model.

Figure 1: Model of indicators to measure the quality of financial statements of public sector organizations (Kristina, 2013)



Quality indicators include:

- Relevance: An opportunity for users of specific information to get the information they want and use it successfully
- Timeliness: A Specific Period of Time
- Understandability: Must be explainable information
- Faithfulness: It's important to get the information from a specific source;
- Verifiability: Must be prepared without missing information
- Comparability: Be comparable to data from other public sector entities

For the most part, research papers that assess the quality of financial statements by quality indicators have been carried out.

The numbers include:

- Structural analysis: Analysis of financial statements by conducting vertical and horizontal analysis and evaluating them

- Relationship Analysis: Specific indicators from the financial statements are examined by selectively measuring the ratio and evaluating whether they are at an appropriate level.

Another indicator that can be measured by the quality of financial statements, according to researchers, is the audit report in the financial statements. The study measured the quality of financial statements of Indonesian public sector organizations based on audit findings and performance indicators. (Rakhman, 2019)

Factors influencing the quality of financial reporting and its implications on good government governance (Nunuy Nur Afiah) In the study, the FRQ was divided into 2 groups and the quality of financial statements was evaluated using the Krusskal Wallis Theory Test, first, the internal audit group had a low level of significance between the FRQ and the good governance performance group. Second, the capacity of public sector accounting and internal auditing were found to be weak positively correlated with FRQ. FRQ had a strong positive relationship with good governance. (Afiah, 2014)

Raden Muhammad Rachmansyah Shadiqiawan, Sri Mulyani (2023): This study examined the quality of the financial statements of local governments in the Indonesian province of West Java and found that the financial reporting data of local governments was not adequately used for decision-making

Akhmad Saebani (2023): This study explored the factors that affect the quality of financial reporting in the local government in Jakarta Province, and the study found that factors such as human resource capacity and internal controls affect the quality of financial statements, but the use of information technology is insufficient

H1: The financial reporting quality of the public sector institution.

Research in public sector financial reporting has increasingly focused on identifying the determinants of audit outcomes and overall financial reporting quality (FRQ). The underlying assumption in many of these studies is that certain organizational characteristics—such as size, financial independence, expenditure patterns, or managerial behavior—can significantly influence the integrity and transparency of financial statements. Logistic regression models are frequently used to examine such relationships, especially when the dependent variable, such as audit opinion, is binary. For instance, studies like Dang et al. (2020) and Muda et al. (2018) have applied logistic regression to assess whether variables such as capital expenditure, audit findings, or internal controls significantly affect the probability of receiving a clean audit opinion, which is often used as a proxy for high FRQ.

A relevant and comparable study is Sutaryo and Sinaga's (2019) research on Indonesian local governments, which found that financial independence and audit findings were significantly associated with financial reporting quality. Their logistic regression results revealed that higher levels of financial autonomy and fewer audit issues increased the likelihood of receiving unqualified audit opinions. This supports the alternative hypothesis that organizational and financial factors are meaningful predictors of audit outcomes. However, the extent to which such findings generalize across different public sector contexts remains debatable, especially in countries like Mongolia where auditing institutions and governance structures may differ. Thus, this study builds on that theoretical framework by testing similar variables in the Mongolian context, with the aim of either reinforcing or questioning the robustness of those established relationships.

H2: At least one of the independent variables has a statistically significant effect on the audit opinion.

Methodology

The data of the survey were selected from the 2023-2024 audit report of the Mongolian national audit office and the Darkhan-Uul, Dornogovi, Umnugovi, Govisumber, Dundgovi, and Selenge provinces were selected as the subject of the study because it is a region that is unique in terms of the number of industrial units, organizations, transport, logistics, geographical location, and economic inclusion among the central regional regions. UWC. (2019). The scope of the audit report relied on the SPSS 25 programs based on data from 676 organizations that qualified to participate in the survey from 1495 organizations that fall under the 2023-2024 budget direct administrator.

We manually prepared the data from the audit reports of 2,332 organizations over a 4-year period on AUDIT.mn, a publicly accessible website of the National Audit Office. However, audit reports from the provinces in the central region were continuously missing for four years. As a result, processing was completed in accordance with the criteria for the years 2023–2024.

We measured the impact of financial performance on the quality of financial statements of public sector institutions and examined the relationship between financial performance and financial statement indicators.

$$FRQit = \mu0 + \mu1CAPEX\ it + \mu2\ SIZEit + \mu3FINDEPit + \mu4REALit + \mu5Incentives + e \quad (1)$$

These include:

FRQit – Financial Reporting Quality A type of audit report issued by the National Audit Office in the financial statements of the current year. (1-Disclaimer of opinion, 2- Adverse opinion, 3-Qualified opinion, 4-Unmodified)

CAPEXit - is the capital expenditure ratio as measured by the amount of the capital expenditure budget divided by the total budget of local government i in year t.

SIZEit - is the natural log of the total assets of local government i in year t.

FINDEPit - is the financial independency ratio as measured by the locally generated revenues divided by the total revenues of local government i in year t.

REALit - is a proxy for managerial effectiveness and is the budget realization ratio as measured by the actual spending divided by the total budget of local government i at year t.

Incentives - is a dummy variable set to 1 if the observation comes from 2010 to 2014 when the central government provides financial incentives, and zero otherwise.

Notably, this model measures the quality of an organization's financial statements through an audit. While most analysts have found that the quality of financial statements is measured based on profit management, or accretion, this measure is not very appropriate for budget

institutions.

Table.1 Distribution of audit opinion

		Count	%
FRQ			
	Disclaimer of opinion	0	0.0%
	Adverse opinion	2	0.3%
	Qualified opinion	51	7.6%
	Unmodified	616	92.1%
Total		676	100%

Table 1 summarizes the distribution of audit opinions among the 676 budgetary institutions analyzed in the study. The vast majority of institutions (92.1%, $n = 616$) received an unmodified opinion, indicating that their financial statements were presented fairly in all material respects. A qualified opinion was issued for 7.6% of the entities ($n = 51$), while adverse opinions were given to only 0.3% ($n = 2$). Notably, no institutions received a disclaimer of opinion. These results suggest a generally high level of financial reporting quality among the sampled public sector organizations.

Results

In the 2023-2024 budget of the Darkhan-Uul, Dornogov, Umnugovi, Govisumber and Dundgovi provinces, 92.1 % of the budget agencies within the scope of the direct governor received unchanged scores. An unaltered summary is provided when all material items are accurately presented in accordance with the Budget Law, the Accounting Act, and the Public Sector Accounting Standard.

Table .2 Descriptive Statistics

Variables	Mean	Standard Dev	Minimum	Maximum
CAPEXit	-0.02	1.08	-13.08	14.45
SIZEit	9.12	0.57	6.20	11.09
FINDEPit	0.06	0.15	0.00	1.00
REALit	0.89	0.20	0.00	1.91
Incentives, n %				
No	326	50.2%	NA	NA
Yes	323	49.8%	NA	NA

Table 2 presents the descriptive statistics for the variables used in the study. The variable CAPEX has a mean of -0.02 and a standard deviation of 1.08, with values ranging from -13.08 to 14.45. SIZE representing the size of the organization, has a mean of 9.12 and ranges from 6.20 to 11.09. The variable FINDEP, indicating financial dependence, has a mean of 0.06, a standard deviation of 0.15, and ranges from 0.00 to 1.00. REAL, representing real activities, has a mean of 0.89 with a minimum of 0.00 and a maximum of 1.91. Regarding the binary

variable Incentives, 50.2% of the organizations (n = 326) reported no incentives, while 49.8% (n = 323) reported the presence of incentives.

Table .3 Independent variables mean difference by audit opinion

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Lower	Upper
CAPEX	Equal variances assumed	.603	.438	-.575	666	.565	-.08978	.15606	-.39620	.21665
	Equal variances not assumed			-1.278	148.215	.203	-.08978	.07025	-.22860	.04905
SIZE	Equal variances assumed	11.268	.001	.042	632	.967	.00361	.08614	-.16554	.17276
	Equal variances not assumed			.029	50.363	.977	.00361	.12260	-.24261	.24982
FINDEP	Equal variances assumed	2.946	.087	1.067	628	.286	.02401	.02250	-.02018	.06821
	Equal variances not assumed			1.675	68.102	.099	.02401	.01434	-.00460	.05263
REAL	Equal variances assumed	4.630	.032	-1.243	564	.214	-.04224	.03397	-.10897	.02449

	Equal variances not assumed			-3.562	160.060	.000	-.04224	.01186	-.06566	-.01882

The results of the independent t-test indicate that there is an equal variance not assumed between the size of the company and the realization of budget, so it is appropriate to choose the Welch's t-test. The analysis indicates a statistically significant difference in the budget realization ratio between entities with modified audit opinions and those with unmodified opinions, based on financial statements audited by the Mongolian National Audit Office. ($p<0.001$)

Table .4 Logistic regression result of FRQ

	B	S.E.	Wald	df	Sig.	Exp(B)
CAPEXit	-0.017	0.180	0.009	1	0.924	0.983
SIZEit	-0.243	0.327	0.553	1	0.457	0.784
FINDEPit	-3.157	2.639	1.431	1	0.232	0.043
REALit	1.389	1.150	1.460	1	0.227	4.010
Constant	-1.738	3.204	0.294	1	0.587	0.176

$p < 0.05$ (*), $p < 0.01$ (**)

Table 4 displays the results of the logistic regression assessing the impact of firm-specific characteristics on Financial Reporting Quality (FRQ). The dependent variable is a binary indicator representing modified versus unmodified audit opinion. The analysis includes capital expenditure (CAPEX), firm size (SIZE), financial dependence (FINDEP), and real activities manipulation (REAL) as independent variables. None of the independent variables show a statistically significant effect on audit opinion at the 5% level.

Discussion

This study examined the impact of selected firm-level variables—capital expenditure (CAPEX), firm size (SIZE), financial dependence (FINDEP), and real activities manipulation (REAL)—on the Financial Reporting Quality (FRQ) of public sector entities in Mongolia. While descriptive statistics revealed that 92.1% of organizations received an unmodified audit opinion, the logistic regression results found no statistically significant relationship between the selected variables and the quality of financial reporting.

This lack of significance may suggest that the variables chosen do not adequately capture the determinants of FRQ in the Mongolian public sector context. Alternatively, it raises questions about the effectiveness and reliability of audit opinions issued by the Mongolian National Audit Office as indicators of FRQ. The high prevalence of unmodified opinions—despite known issues in public sector financial management—suggests the possibility that audit opinions may not fully reflect the underlying quality of financial reporting, potentially due to institutional, political, or capacity constraints within the audit office.

These concerns align with findings from the study by Susanto et al. (2019) titled “Determinants of Financial Reporting Quality in the Public Sector: Evidence from Indonesia”.

In their research, audit opinion was found to be significantly associated with financial reporting quality, and the presence of modified opinions served as a credible signal of low-quality reporting. Their study also highlighted the role of auditor independence and institutional oversight in ensuring the integrity of audit outcomes—factors that may not be as strongly enforced in the Mongolian context.

The contrast in findings suggests that institutional quality and audit enforcement mechanisms may play a crucial role in the usefulness of audit opinion as a proxy for FRQ. In Indonesia, where external oversight and anti-corruption frameworks have been strengthened in recent years, audit opinion appears to serve as a more valid measure of FRQ. In Mongolia, the dominance of unmodified opinions, even amid potential financial or operational risks, may point to systemic limitations in audit rigor, auditor independence, or the political economy of public sector auditing.

Conclusion

The purpose of this study was to assess the quality of financial statements prepared by budget institutions directly accountable to the budget authorities of Darkhan-Uul, Dornogov, Umnugovi, Govisumber, and Dundgovi provinces, and to identify the key factors influencing financial reporting quality (FRQ). Based on the data collected and analyzed, the following key conclusions can be drawn:

1. Financial Reporting Quality: Descriptive analysis revealed that 92.1% of the organizations received unmodified (clean) audit opinions, suggesting a high level of compliance with the applicable public sector financial reporting standards. This finding may indicate that the use of International Public Sector Accounting Standards (IPSAS) has contributed positively toward ensuring transparency, accountability, and compliance with legal and regulatory requirements.
2. Logistic Regression Results: Despite the high incidence of unmodified audit opinions, the logistic regression analysis found no statistically significant relationship between the selected explanatory variables—capital expenditure (CAPEX), firm size (SIZE), financial dependence (FINDEP), and real activities manipulation (REAL)—and financial reporting quality. This result raises concerns about whether audit opinions, as currently issued by the Mongolian National Audit Office, are fully reliable indicators of the actual quality of financial statements. It also suggests that further investigation is needed into other potential institutional or contextual factors affecting FRQ.

Suggestions for Future Research and Policy

- Improve Data Accessibility: Public sector audit reports should be made more accessible in a structured, research-friendly format. Currently, although audit reports are publicly available, their format (PDF) makes automated data collection and analysis difficult.
- Link with Strategic Goals: Future studies should consider aligning the assessment of FRQ with the performance indicators outlined in national development strategies, such as Mongolia's Sustainable Development Vision 2030, to provide a more comprehensive view of financial management effectiveness.

Limitations

The findings of this study should be interpreted with the following limitations in mind:

- Geographical Scope: The sample was limited to five provinces; therefore, the results may not be generalizable to all Mongolian provinces or national-level institutions.
- Internal Control Factors: The study did not evaluate the effectiveness of internal controls, which may have a significant influence on financial reporting quality.

This research contributes to the limited literature on public sector financial reporting quality in Mongolia and offers a foundation for further empirical work. Future studies should explore broader institutional factors, audit independence, and internal control mechanisms to better understand and improve the reliability of financial statements in the public sector

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Study on Factors Influencing Organizational Digital Maturity

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Abstract. Recent years have witnessed rapid advancements in technology and digital innovation, ushering in the era of artificial intelligence. Government agencies and business organizations have actively pursued technological innovations, cultivated digital cultures, and undertaken digital transformation initiatives. Despite nearly 80% of companies having embarked on digital transformation efforts, approximately 90% encounter significant obstacles to success. According to research by McKinsey, the top 10% of highly digitalized companies generate up to 80% of their industry's digital revenue (Dieffenbacher S. F., 2022). Additionally, research by Everest Group indicates that 73% of organizations have failed to realize tangible business value from digital transformation, with 78% not achieving their intended objectives; only 22% report success in attaining desired outcomes (Bendor-Samuel, 2019). To assess the current level of organizational digital maturity and identify influential factors, this study conducted a comparative analysis of approximately 20 digital transformation models, complemented by a survey administered via Google Forms. The data were analyzed using factor evaluation methods to pinpoint key determinants of digital maturity. Results reveal that most organizations have only partially defined their digital strategies, with plans to strengthen collaboration with technology providers and to enhance automation and digital initiatives. The most significant factors affecting digital maturity include digital culture, technological diversity, organizational capabilities, and user knowledge and behavior. While strategy, technology, operations, and culture were found to positively influence digital maturity, product and organizational factors did not demonstrate statistically significant effects. This research underscores the importance for Mongolian SMEs to prioritize strategic planning, technological adoption, cultural transformation, and employee training to enhance digital maturity and competitiveness in an increasingly digitalized environment.

Keywords: *digital maturity, culture, strategy, customer, technology, SMEs, Mongolia*

Introduction

The global digital revolution is bringing new opportunities and challenges to business organizations. Although around 80% of companies have attempted digital transformation, 90% of them encounter serious obstacles, and 78% fail to achieve their goals. This is particularly challenging for small and medium enterprises (SMEs). SMEs are a pillar of the global economy, contributing 55% to the GDP and 60-70% to employment in developed countries. In Mongolia, however, SMEs account for 75.7% of businesses but contribute only 5.5% to GDP,

which is a pressing issue (NSO, 2023). Additionally, Mongolia ranked 64th out of 67 countries in the 2024 Global Digital Competitiveness Index, placing last (67th) in SME performance (IMD, 2024). Due to their size and limited resources, SMEs face difficulties in strategic orientation, resource allocation, and adapting to market changes in today's competitive business environment. According to research by MIT and Capgemini (2012), companies with high digital maturity outperform their competitors by 26% in profitability, generate 9% more revenue, and have a 12% higher market valuation (Capgemini Consulting and the MIT Center for Digital Business, 2012). McKinsey's research indicates that companies expect a 5-10% or higher annual growth in revenue and cost savings from digital initiatives over the next 3-5 years (Catlin, T., Scanlan, J., & Willmott, P, 2015). Deloitte's research shows that organizations with high digital maturity experience significantly higher annual revenue growth than their industry average, nearly three times the net profit of less mature organizations. Therefore, digital transformation and maturity are key factors in improving SME performance and competitiveness. However, in Mongolia, there is a lack of research and analysis on SME digital maturity and the factors influencing it, creating a need for further studies. Thus, our goal is to determine the current state of digital maturity among SMEs in Mongolia and identify the factors affecting it under local conditions.

Literature review

Digital maturity is a gradual process of integrating and implementing organizational processes, human resources, and other resources into digital processes. Digital maturity models help organizations assess the extent of their digital transformation and identify areas for improvement. Digital maturity defines the level to which a company has transitioned to a digital format, reflecting how deeply digital approaches are integrated across all aspects of the company, including employee habits (Fitzgerald, 2014; Kane, 2017; Gill, M., & VanBoskirk, S. Forrester, 2016). Maturity models are widely used tools to recognize and measure process performance and maturity levels to improve organizational processes (Simon A., Schoeman P., & Sohal A., 2010; Santos, R.C. & Martinho, J.L, 2019). These models also help evaluate the progress of digital transformation and identify areas for enhancement. Developing maturity models as consistent tools to measure digital skills and competitiveness is crucial, as these models have unique characteristics, scopes, and differences. Table 1 compares the factors influencing digital maturity.

Table 1. Comparative Study of Digital Maturity Factors

DM action fields	Existing SMEs digital maturity models																				
	DMM	MAADM	IMM	DMRM	DTM	DTCMMF	SDT	DMM	MMD	MMER	MMR	MMP	DRA	MM	DMM	MMDID	DRMM	DCM	DAM	DTM	Total
Strategy	0	1	1	1	0	0	0	1	1	1	0	1	1	0	1	1	1	1	1	1	14
Technology	0	1	1	1	0	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	14
People	0	1	1	1	1	0	0	0	0	1	0	1	1	0	1	0	0	1	1	1	11
Product	1	0	1	1	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	0	9
Operations	0	0	0	1	0	1	1	1	1	1	0	0	1	0	1	1	0	0	0	0	9
Organization	0	0	0	0	0	1	1	0	0	1	1	0	1	0	1	0	0	1	0	0	8
Customer	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	1	1	1	0	0	7
Transformation	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4

Culture	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	4
Leadership	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3
Value proposition	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Digital support	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
Data management	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ecosystem	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Laws	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Finance	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
External factors	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1

Sources: Authors' Elaboration

Strategy, product, employees, organization, operations, customers, technology, and culture are the most frequently used and critical dimensions in digital maturity models, making them essential for evaluating digital maturity (Table 1.)

Strategy

Strategy refers to how an organization supports, manages, and implements its digital strategy. A digital strategy involves developing strategies, guiding internal digital operations, and directing activities within the framework of digital strategy implementation. Communication of the digital strategy informs employees about its purpose, importance, and future implementation plans. Its impact on service offerings is related to digital technology, enabling organizations to make digital changes and improve service offerings to become stronger market players (Gill, M., & VanBoskirk, S. Forrester, 2016).

Operations

This refers to the process of executing and developing processes and tasks using digital technologies to improve business efficiency and benefits under strategic management (Anderson, C., & Ellerby, W., 2018). This dimension includes flexible operations, automated and decentralized processes, continuous improvement, and effective supplier management (Westerman G., Bonnet D.,& McAfee A., 2014; Isaev, E. A., Korovkina, N. L., & Tabakova, M. S., 2018). Collaboration and integration with technology providers involve how often and effectively an organization works with technology suppliers, leverages third-party capabilities to drive improvements, and enhances performance. Digital governance helps increase digital skills and supports the appropriate use of digital technologies to achieve planning and performance benefits (Gurumurthy R., Nanda R., & Schatsky D., 2021).

Technology

Technology involves the practical application and adoption of emerging digital technologies. According to Gill and VanBoskirk (2016), digital technologies lead to various performance improvements, but leading and emerging technologies drive strategic performance to higher levels. Technology types include cloud computing, automation, artificial intelligence, analytics software, and web-based tools. Organizational capability relates to how digital technology enhances organizational capacity and objectives, best measured by the benefits to businesses with high digital maturity. Regarding process integration, digitizing processes makes operations more efficient and brings tangible changes, but unclear structures in integrated

technologies can create variations in usage and performance for organizations (Gurumurthy R., Nanda R., & Schatsky D., 2021).

Product

Some researchers include product as a dimension when measuring digital maturity levels. For example, some refer to "smart products (Nick G., 2019; Rafael LD, 2020) " while others simply call it "product (Schumacher A., 2016; Trotta D, & Garengo P, 2019) " though the evaluation of this dimension is similar. It focuses on factors such as the level of innovation in products, product uniqueness, and the level of integration with other systems (Majstorović et al., 2020; Nick et al., 2019; Schumacher et al., 2016). Blatz et al. (2018) argue that products requiring data collection must be equipped with relevant digital technologies, such as sensors, computing, and communication capabilities.

Employees

This dimension is referred to differently in research, with some using "people" (Majstorović et al., 2020; Schumacher et al., 2016; Trotta & Garengo, 2019) and others "employees" (Gonzalez-Varona et al., 2020; Rafael et al., 2020; Schumacher & Sihn, 2020). However, these studies evaluate it similarly, focusing on digital skills, knowledge, training, employee openness to adopting new technologies, level of autonomy, and employee development through knowledge sharing (Goerzig D., 2018; Nick G., 2019; Schumacher A., 2016).

Organization

The organizational dimension is often combined with culture (Blatz et al., 2018; Gamache et al., 2019; Majstorović et al., 2020) or strategy (Nick G et al., 2019; Rafael et al., 2020). Goerzig et al. (2018), Horvat et al. (2018), and González-Varona et al. (2020) include organization as a separate dimension in their models. Goerzig et al. (2018) evaluated this based on strategic implementation, while Horvat et al. (2018) focused only on production and logistics organization. It assesses openness to digital technologies, usage, value chains, structural changes, flexibility, and dynamic capabilities (Gonzalez-Varona, 2020).

Customer

The customer dimension is included in some studies (Gamache et al., 2019; Majstorović et al., 2020; Schumacher et al., 2016). For instance, Schumacher et al. (2016) and Majstorović et al. (2020) evaluated businesses based on the existence of customer databases, how these are used, and how sales and services are digitized. They also considered customer experience, communication, and how well businesses understand and respond to customer needs and changes (Klohs K, & Sandkuhl K., 2020).

Culture

Researchers such as Gamache et al. (2019), Ramos et al. (2020), and Schumacher (2016) agree that culture is a critical dimension for measuring digital maturity. Gamache et al. (2019) define culture as supporting innovation, continuous improvement, skill development, and employee openness to change. Culture is an ongoing process that transforms business operations, aligning with the definition of digital transformation. Gonzalez-Varona et al. (2020) note that leading businesses in digital transformation have open cultures, high risk-taking capacity, and invest in skill development. Schumacher et al. (2016) and Majstorović et al. (2020) also evaluated collaboration, communication, innovation levels, and external partnership levels within organizational culture.

Methodology

This study's data comes from a survey of 97 questions answered by managers of SMEs in Mongolia. The survey aims to assess the current state of SME digital maturity and identify influencing factors. There are 76,561 SMEs in Mongolia with up to 199 employees, and the

optimal sample size for the study is 383 SMEs, with managers of these organizations participating.

Research Hypotheses

We proposed the following hypotheses to study SME digital maturity and its influencing factors:

- Variables such as strategy, operations, technology, product, people, and organization influence organizational digital maturity.
- Organizational culture and customers influence digital maturity.
- Organizational scope indicators, such as revenue, number of employees, and experience, influence digital maturity.

Variables were selected based on widely used and validated measures in international research, detailed in Table 2.

Table 2. Research variables

	Variables	Dimension	Subdimension	Authors
Digital maturity	Strategy	3	11	(Gill, M., & VanBoskirk, S. Forrester, 2016)
	Technology	3	8	(Gurumurthy, R., & Schatsky, D., 2019)
	Operations	4	10	(Westerman, G., & Mc-Afee, A., 2012)
	Customer	4	18	(Berghaus, S., & Back, A., 2016)
	Organization	4	12	
	Culture	3	13	(Gollhardt, 2020)
	People	5	15	(Neuland, 2015)
	Product	3	10	
	Organizational charachteristics	4	4	

Source(s): Authors

The digital maturity level was evaluated using 8 main dimensions and 97 questions in a survey, with statistical analysis conducted using SPSS-24. The study included all active SMEs in Mongolia, focusing on organizational-level performance, with managers of organizations with up to 199 employees participating..

Results

To identify factors influencing organizational digital maturity, a survey was conducted and analyzed among 390 SMEs managers in Mongolia. The hypotheses were tested using the following analyses, with statistical processing performed using SPSS 24. General information about survey participants is detailed below.

Table 3. SMEs characteristics

Factor		Frequency	(%)	Factor		Frequency	(%)
Investment	Foreign	8	2.1	Annual Income (mm.mnt)	<300.0	92	23.6
	Domestic	328	84.1		300.0 - 999.9	57	14.6
	Joint Venture	54	13.8		>1000.0	241	61.8
	Web App	139	35.6	Experience	<1 year	25	6.4
	Mobile App	30	7.7		1–5 years	110	28.2

DMAM tool	Neither is available	87	22.3		6–10 years	122	31.3
	Both are available	134	34.4		>10 years	133	34.1

Source(s): Authors

In terms of business sectors, 8 sectors participated, with the trade sector being the largest at 33.8%, followed by other services at 21.8%, and manufacturing at 13.6%, while hotels, accommodations, and food services accounted for the smallest share at 2.6%. Regarding years of operation, 34.1% of organizations have been operating for over 10 years, 31.3% for 6-10 years, 6.4% for less than 1 year, and 28.2% for 1-5 years. Of the participating organizations, 35.6% have a website, 7.7% have a mobile app, 34.4% have both, and 22.3% have neither. Based on annual revenue, the majority (61.8%) have revenue exceeding 1 billion MNT.

Factors Influencing Organizational Digital Maturity

Following Omol (2024) and other theoretical frameworks, we analyzed variables such as product, technology, organization, people, strategy, operations, culture, customers, and organizational scope (e.g., number of employees, revenue, experience) to test additional hypotheses. Descriptive statistics for the variables are shown in Table 4.

Table 4. Descriptive Statistics of Variables

Variables	Mean	St.D
Experience	2.930	0.936
Employee	2.110	0.785
Revenue	2.380	0.842
Strategy	3.477	0.864
Operation	2.995	0.709
Technology	3.456	0.879
Culture	3.452	0.849
Product	2.586	0.891
People	2.908	0.790
Organization	2.745	0.922
Customer	3.308	0.609
Digital maturity	3.776	0.779

The descriptive statistics show the mean values and standard deviations, and the standard deviation of each variable being significantly different from zero indicates that it is possible to conduct causal and correlational analyses among the variables.

Table 5. Correlation Coefficients Between Factors Influencing Digital Maturity

	DS	DOp	DT	DCul	DPr	DPe	DOr	DCus	DM	OCh
DS	1									
DOp	.643**	1								
DT	.770**	.674**	1							
DCul	.775**	.645**	.858**	1						
DPro	-0.081	-0.001	-147**	.105*	1					
DPe	0.062	.156**	0.042	0.082	.602**	1				

DOr	.153**	.200**	.160**	.160**	.530**	.637**	1			
DCus	.439**	.360**	.396**	.476**	0.076	.194**	.120*	1		
DM	.599**	.527**	.621**	.624**	0.03	.134**	.115*	.450**	1	
OCh	-.128*	0.030	0.064	.103*	0.01	0.007	0.046	-0.047	.153**	1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
Note. DS- strategy, DT -technology, DM- digital maturity Dcul- culture, DOp-operation, DPro -product, Dor-organization, DCus- customer, DPe- people, Och- organizational characteristics.

Strategy (DS) shows a strong positive correlation with operations (DOp), technology (DT), culture (DCul), and digital maturity (DM), a moderate positive correlation with customers (DCus), and no correlation with products (DPro), organization (DOr), and organizational characteristics(OCh). Operations show a strong positive correlation with technology, culture, and digital maturity, a weak positive correlation with organization and customers, and no correlation with products, people, and organizational scope. Technology shows a strong positive correlation with culture and digital maturity, a weak positive correlation with customers, and no correlation with people, organization, and organizational scope. Culture shows a moderate positive correlation with customers, a strong positive correlation with digital maturity, and no correlation with products, people, organization, and organizational scope. Products show a moderate positive correlation with people and organization, and no correlation with customers, digital maturity, and organizational scope. People show a positive correlation with organization and products but no correlation with any other variables. Organization shows a positive correlation with people and products but no correlation with any other variables. Customers show a moderate positive correlation with digital maturity and no correlation with organizational scope. Digital maturity shows no correlation with organizational scope.

Regression Analysis

Our hypotheses were related to the factors influencing digital maturity, and we tested these causal relationships using the following empirical multivariate regression model.

$$DMAM=0+1DS+2DOp+3DT+4DCul+5DPro+6DPe+7DOr+8DCust+9DOCh+u$$

The multivariate regression analysis of factors influencing an organization's digital maturity was evaluated based on factors such as strategy, operations, technology, culture, products, people, organization, customers, and organizational scope, with the results (Model 1) shown in the following table. The variables for products (DPro) and organization (DOr) were found to be statistically insignificant. Therefore, the above variables, which have no impact or are statistically insignificant, were excluded, and the model was redefined and re-evaluated. The results (Model 2) are shown in the following table.

Table 6. Regression Analysis Results of Factors Influencing Digital Maturity

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.224	.231		5.306	.000
	DS	.132	.058	.146	2.267	.024
	DOp	.136	.059	.124	2.331	.020
	DT	.214	.071	.241	3.027	.003
	DCul	.125	.073	.137	1.725	.085

	DPro	-.008	.043	-.009	-.173	.863
	DPe	-.100	.053	-.101	1.902	.058
	DOr	-.058	.043	-.068	-1.335	.183
	DCus	.212	.055	.166	3.825	.000
	OCh	.121	.047	.098	-2.593	.010
2	(Constant)	1.210	.225		5.375	.000
	DS	.128	.058	.142	2.203	.028
	DOp	.135	.058	.123	2.309	.021
	DT	.208	.070	.234	2.978	.003
	DCul	.126	.073	.138	1.739	.083
	DPe	-.052	.028	-.052	1.857	.069
	DCus	.218	.055	.171	3.962	.000
	OCh	.125	.047	.101	-2.690	.007

a. Dependent Variable: DM

Regression results indicate that strategy and operations have a positive influence at the 5% significance level, while technology, customers, and organizational characteristicshave a positive influence at the 1% significance level. Culture has a positive influence at the 10% significance level, while people have a negative influence at the 10% significance level. Product and organizational factors, although negative, are statistically insignificant.

Table 7. Regression Model Results, Significance, and Explanatory Power

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	113.583	7	16.226	50.461	.000[b]
	Residual	122.836	382	.322		
	Total	236.418	389			
	R Square	0.671				

a. Dependent Variable: DM
b. Predictors: (Constant), OCh, DPe, DT, DCus, DOpe, DS, DCul)

The F-statistic and p-value in Table 7 show that the model as a whole is significant, with an R-squared of 67.1%, meaning that strategy, technology, people, customers, culture, operations, and organizational characteristicscollectively explain 67.1% of the variation in SME digital maturity.

5. Conclusion

This study assessed the current state of digital maturity among SMEs in Mongolia and identified influencing factors through a survey of 390 businesses, representing the sector at a 95% confidence level. Results confirm that digital maturity impacts organizational performance. Key findings show that strategy, technology, operations, culture, customers, and organizational characteristicspositively influence digital maturity, while product and organizational factors are statistically insignificant. Digital maturity is a key factor in improving SME performance and competitiveness, with strategy and technology having the strongest impact, followed by culture and customers. However, the negative influence of people-related factors suggests challenges in employee digital skills, knowledge, and adoption of new technologies, indicating a need for more training and development. The model's R-squared of 67.1% shows that these factors relatively well explain SME digital maturity. Finally, this research recommends that Mongolian SMEs focus on strategic development, technological advancement, cultural change, and improving customer

engagement to enhance digital maturity. Continuous training to improve employee digital skills is also a critical step for successful digital transformation. Future research should consider sector-specific characteristics and external environmental influences to further advance digital maturity.

6. Discussion

Researchers in this field are advised to conduct more detailed studies considering sector-specific characteristics and external environmental factors to improve digital maturity.

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Optimizing the Financing of Government-Provided Tuition Support Types in Higher Education

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Abstract. The government has been creating and funding many programs to help students with tuition fees. These efforts aim to support higher education and develop skilled workers for our economy. When government funding is allocated effectively, more students get the chance to pursue college degrees. In our research, we're comparing how different tuition support programs are currently funded and exploring how these programs should ideally be funded in the future.

Keywords: *student tuition, financial aids, higher education, tertiary education, education expenditure*

Introduction

In Mongolia, since the establishment of the "National University of Mongolia" in 1942, citizens were given the opportunity to pursue higher education in their own country for the first time. From that time onward, the government supported top-performing students and provided higher education free of charge. However, starting in 1993, students began to bear the costs of their tuition and living expenses. Despite this shift, the government has continued to fund the tuition fees of students who meet specific criteria. Since then, approximately forty support programs aimed at promoting higher education have been implemented. Nevertheless, the effectiveness of these programs, as well as how efficiently the government allocates funding to the currently active programs, remains unclear to this day.

Methodology

We obtained the number of students at universities from the website of the National Statistics Office. (Mongolian statistical information service, 2025) Amount of tuition fees for universities and colleges was sourced from the higher education report prepared by the Ministry of Education and Science. (Statistical Information in the Education and Science Sector, 2018-2024) Additionally, information regarding the number of students who received loans and scholarships for studying both domestically and abroad, as well as the amount of government funding, was sourced from the website and reports of the Education Loan Fund. (Educational loan fund, 2025) Using these datasets and relevant numerical indicators, we applied methods of analysis and synthesis. To compare the means between students studying domestically and students studying abroad, we conducted an independent two-sample t-test, and the results were interpreted accordingly.

Current situation in Mongolia

Mongolia has implemented various support programs to assist students pursuing higher education. The Education Loan Fund has provided financial support since 1993. The diagram presented illustrates the amount of funding distributed to students over the years.

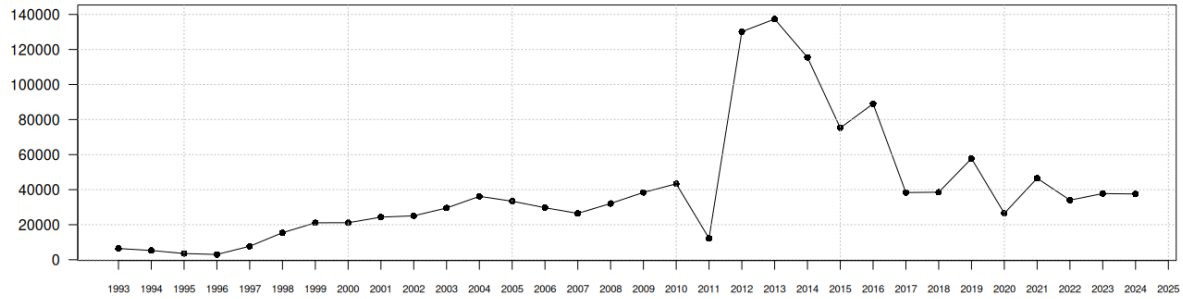


Figure 1: Mongolian government expenditure on tertiary educational aids (million tugtiks)

The government emphasizes preparing skilled professionals through higher education and continues to allocate funding annually. However, it is crucial to assess whether these resources are accessible to students and optimally allocated among the different types of programs.

As illustrated in this bar plot, the number of students studying in Mongolia who receive government-funded tuition support is significantly higher than that of students studying abroad.

Let us now compare the number of students and the amount of funding they received under the "Government grant" program, depending on whether they studied domestically or abroad.

The number of students studying in Mongolia greatly exceeds that of those studying abroad. From 2018 to 2024, a total of 100883 students received domestic support, while only 5657 students received support to study abroad — a ratio of approximately 17.8 to 1.

Despite this difference in the number of recipients, the amount of funding provided each year was nearly equal for both groups. On average, domestic students received 15.169 billion MNT annually, while students abroad received 17.217 billion tugriks.

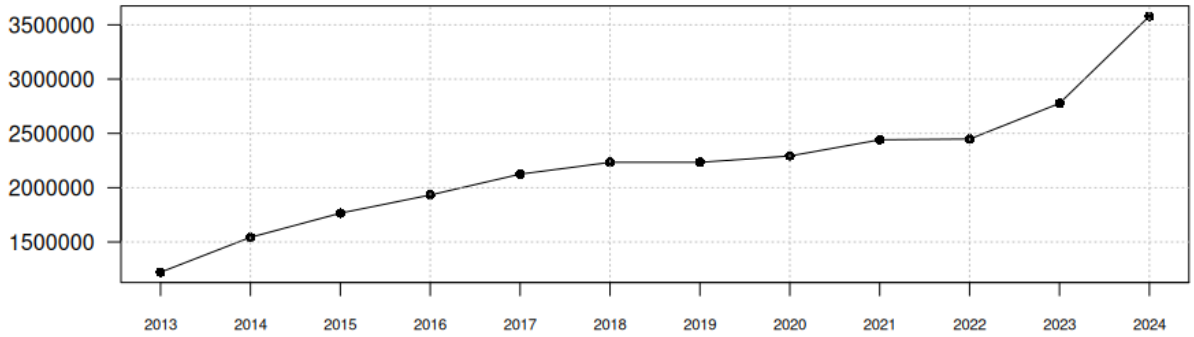
```
        Welch Two Sample t-test

data:  Numbers of studing in Mongolia and Numbers of studing abroad
t = -0.69681, df = 11.627, p-value = 0.4996
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -8475.709  4379.214
sample estimates:
mean of x mean of y
 15169.09  17217.34
```

A hypothesis test comparing the funding levels suggests that there is no statistically significant difference between the two groups at the 0.05 confidence level.

These results indicate that although the government spends a similar amount of money on both groups, the number of domestic students supported is about 20 times greater. In other

words, the funding used to support one student abroad could instead support 20 students domestically, highlighting an inefficiency in fund allocation.

Tuition Fee Trends



Tuition fees have been steadily increasing since 2013, as shown in the accompanying graph. This rise has intensified the need for tuition support among students.

Discussion

Although many individuals meet the admission requirements for higher education, they are still unable to pursue it due to financial constraints. An effective solution to this issue is for the government to provide financial support for students' tuition fees. In her 2003 study, Dynarski concluded that "tuition discounts increase the likelihood of university enrollment among children from low-income families by 15–30%." Psacharopoulos & Patrinos (2004) emphasized that higher education yields high returns at both the individual and societal levels, and demonstrated through their research that targeted funding is more efficient. Similarly, Goldrick-Rab (2010) identified that “when financial aid is stable and continuous, students’ academic performance and graduation rates improve.”

In an empirical study conducted in 14 developing countries, Filmer (2003) highlighted that higher education funding often benefits students from wealthier households, underscoring the need for equitable distribution to reduce inequality. Ziderman (2003) noted that when financial support is allocated based on clear objectives and criteria, it positively impacts access to and the quality of higher education. Furthermore, Hanushek (2012) stressed that to maximize the returns on human capital, investments in higher education must be well-allocated and optimized.

From the aforementioned studies, it is evident that financial support remains essential for accessing higher education. Moreover, the manner in which such support is distributed is inextricably linked to educational accessibility, equity, and effectiveness. Therefore, developing a policy for the optimal allocation of public education funding can serve as a foundational step toward enabling more youth to pursue higher education and promoting social equity.

Conclusion

Although the government has implemented many support programs for higher education students, the allocation of funding across these programs is inefficient. The continuous annual increase in tuition fees has further heightened students' need for tuition support.

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Experimental Study on a Teaching Method Based on Students' Diverse Needs in Vocational and Technical Education Schools

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Abstract. This research identified the cognitive characteristics of students in vocational and technical education schools and developed a methodological approach tailored to their diverse needs. The approach was tested with both experimental and control groups. Gardner's Multiple Intelligences Test was administered to 55 students, who were then grouped based on their cognitive profiles. A task-based experimental teaching method was applied accordingly. The method was designed in alignment with an integrated vocational education curriculum, specifically for automobile mechanics and plumbing and heating system maintenance. The topic "Gas and Liquid Pressure" was taught using a combined chemistry and physics curriculum. Assessments were conducted before and after grouping students based on their cognitive profiles. An analysis of the assessment results showed that the average scores before and after the experimental lessons were 45.51 and 60.65, respectively, indicating a significant improvement in student performance. These findings suggest that incorporating multiple intelligences theory can be an effective teaching strategy for both educators and students.

Keywords. *Vocational and technical education training institutions, programs, integration, learners, intelligence, lesson*

Introduction

Since 1972, the global community has developed and adopted numerous documents—including declarations, policies, strategies, frameworks, and programs—to advance sustainable development (SD) and Education for Sustainable Development (ESD). These documents have served as guiding frameworks for nations to reform their education systems, contributing to significant progress not only at national levels but also globally. Over time, valuable lessons, experiences, and principles have been accumulated. Initially, the process of drafting and finalizing these documents was relatively slow. However, following the adoption of the "Transforming Our World: The 2030 Agenda for Sustainable Development" by the UN General Assembly in 2015—which introduced the 17 Sustainable Development Goals (SDGs)—the pace of implementation has accelerated significantly. Notably, UNESCO has since released several key documents outlining the conceptual and methodological foundations for transforming education between 2015 and 2030, along with long and medium-term action plans. In this context, Mongolia must actively engage in this global movement without falling

behind. To translate educational reforms into tangible outcomes, the nation must: Empower Teachers – Provide comprehensive training and resources to tens of thousands of educators, equipping them with: the historical evolution and modernization trends of global and Mongolian education, methodological tools to adapt to new developmental challenges, practical support for optimizing classroom practices. Strengthen Participation in the SDG Framework – Mongolia must: engage openly and proactively in the 2030 Sustainable Development Agenda, *m*aintain its unique national identity while enhancing competitiveness, expand the scope of its contributions to meet global standards. (SDG-II project, 2021)

The second UNESCO World Forum on Global Citizenship Education (GCED) discussed the current situation and future needs of GCED in the new context that has emerged since 2015, and identified GCED's priorities and strategies for action and its contribution to the implementation of the new Education 2030 framework since 2015.

New century learning is inextricably linked to a new approach to education that transforms teaching methods, curricula and learning environments to meet new demands and challenges. New century learning is characterized by its emphasis on critical thinking, problem-solving, collaborative learning, creativity and innovation, lifelong learning, adaptability, and social and emotional skills (Oyuntsetseg, 2023). Although there are many models of cross-curricular integration in the global citizenship education process, there is a lack of integration between subject content and learning objectives in the curriculum of physics and chemistry. Therefore, we will develop, test, and study teaching methodologies based on the different needs of students, contributing to the new century and global citizenship education for students in vocational and technical education institutions. The purpose of this study is to identify the diverse intellectual characteristics of students in vocational and technical education institutions, develop and pilot an integrated curriculum tailored to these differentiated needs, and evaluate the learning outcomes.

Objective

To identify the diverse intellectual characteristics of students in vocational and technical education training institutions, develop and pilot an integrated curriculum based on these distinct needs, and evaluate the learning outcomes.

Literature review

Education has been changing throughout the history of industry. The first three industrial revolutions were Education 1.0 (teacher-centered approach), Education 2.0 (peer-based, teacher-centered), and Education 3.0 (collaborative, learner-centered), while the current Education 4.0 is the emergence of new educational technologies based on a variety of tools in a culturally diverse environment. (Tikhonova, 2023)

American psychologist Howard Gardner, a professor of Harvard University, published his book "Frames of Mind: The Theory of Multiple Intelligences" in 1983, and first proposed a new theory of the multiple nature of intelligence. He also identified two additional intelligences in his work Intelligence Reframed (1999). His theory challenges the traditional view that people are born with the same cognitive abilities and can be tested with a short test. Gardner argues that education is about helping people understand the world. The world is full of amazing things, and our minds are interested in learning about them, but education should also help people find their place in the world. If we understand that we will not repeat our past mistakes and move forward in the right direction, then the question arises: what can we do to make that understanding more meaningful? That is why self-awareness is so important. Gardner identifies 9 characteristics of intelligence. (Badarch.D, 2021).

Howard Gardner's intelligence characteristics are: Linguistic intelligence (1); Mathematical-logical intelligence (2); Visual-spatial intelligence (3); Musical intelligence (4); Bodily-kinesthetic intelligence (5); Survival intelligence (6); Interpersonal intelligence (7); Self-awareness intelligence (8); Environmental intelligence (9); (Badarch.D, 2021) Everyone's intelligence is unique and different, and some people have more than one or two intelligence traits, while others are average. Identifying and recognizing your own intellectual abilities early on supports your strengths, develops your learning style, and makes it much easier to acquire new knowledge, skills, and abilities. A curriculum based on the integration of natural sciences based on intelligence traits is being developed and implemented at the school level. Gardner's theory has had the greatest impact on the field of education, and has been widely studied and used. His view of intelligence as more than a single trait has opened the door to further research and alternative ways of thinking about human intelligence.

Teachers can improve their teaching by using differentiated instructional methods based on the different needs of students, their intellectual abilities, learning styles, and personalities. (Altangerel.B, Tsolmon.R, & Khulan.O, 2022). Integrated learning research is increasingly becoming an international field. There is a lack of research and information on the different learning styles, multifaceted nature of intelligence, and the quality of teaching. Every Mongolian student needs a methodology to improve the quality of natural science lessons.

Depending on their intellectual abilities, each student learns effectively in different ways. For example, students with good logical and mathematical abilities respond well to critical thinking methods, the Socratic method, analysis, calculation, rational thinking, comparison, experimentation, problem solving and classification. (Dorj.B, 2022)

The advantages and values of this study

- First-time research for students of professional and training institutions.
- Designed not merely for single application, but fully adaptable for continued use in training operations.
- Other training methods and formats can be redesigned to accommodate the diverse needs of each learner.

Methodology and data

The research consists of 3 parts. These are :

- Students of vocational and technical education and training institutions (TVET) were given a self-assessment test with 108 questions from 9 sections of questions to determine Howard Gardner's intelligence characteristics on a scale of 1-5 and divided into 9 groups based on the corresponding characteristics.
- A test with 20 questions to determine the level of knowledge of the course content to determine the quality of teaching was conducted twice, and 25 students who studied the content of the integration course and 30 students in the control group participated.
- The experimental lesson for the experimental group was on the topic of “Gas and Liquid Pressure” and integrated content of chemistry and physics courses, divided into teams based on the intellectual characteristics of each student, assigned tasks, and conducted using experimental methodology. It was based on the integration curriculum with the vocational education courses of automobile repairman and construction plumbing repairman.

The following nine tasks were performed based on the characteristics of the mind:

- Verbal intelligence - reading, writing reports, answering questions
- Logical intelligence - calculating, comparing, experimenting, solving problems,
- Musical intelligence - talking, listening to music, explaining and discussing the content of the lesson

- Visual-spatial intelligence - interpreting pictures, graphs, pictograms, photographs
- Bodily-kinesthetic intelligence - working in teams, telling stories, practicing
- Communication intelligence - working in teams, group work, teaching friends and peers, making presentations
- Existential intelligence - making conclusions in situations
- Loving the world and cognitive intelligence - observing, processing information, making conclusions in classroom situations
- Self-aware intelligence - free choice time, self-reflection, thinking tasks, repetition, and observation

Analysis

Gender of the study participants of the 55 students who participated in the study, 10 or 18.8% were female and 45 or 81.8% were male. Table 1 shows the age distribution of the students who participated in the study. 49% of the total students who participated in the study were 16 years old.

Table 1. Age of survey participants

15 age	*16 age*	*17 age*	*18 age*	*Total*
19	*27*	*7*	*2*	*55*
27,2%	*49,09%*	*12,7%*	*3,6%*	*100%*

Table 2 shows the classification of the multiple intelligences of students in the experimental and control groups. It can be seen that 29.09% of all students have dominant bodily-kinesthetic intelligence, while 21.81% exhibit characteristics of interpersonal intelligence.

Table 2. Multifaceted intellectual characteristics of the total survey participants

№	*Intellectual characteristics of the study participants*	*Experimental group*		*Control group*	
1	*Linguistic intelligence*	*1*	*4%*	*0*	*0%*
2	*Logical-mathematical intelligence*	*2*	*8%*	*2*	*6,6%*
3	*Musical intelligence*	*1*	*4%*	*3*	*10%*
4	*Visual-spatial intelligence*	*2*	*8%*	*2*	*6,6%*
5	*Bodily-kinesthetic intelligence*	*8*	*32%*	*8*	*26,6%*
6	*Interpersonal intelligence*	*6*	*24%*	*6*	*20%*
7	*Existential intelligence*	*2*	*8%*	*3*	*10%*
8	*Naturalistic intelligence*	*0*	*0%*	*3*	*10%*
9	*Intrapersonal intelligence*	*5*	*20%*	*2*	*6,6%*
	Total	*25*	*100%*	*30*	*100%*

Table 2 presents the reliability and validity of the test used to assess the intellectual characteristics of the students. The results confirm that the test is both reliable and valid, as shown in the Table 3.

In the Table 3, Cronbach's alpha coefficient is 0.889, indicating strong internal consistency among the 9 measured indicators. This suggests that the test items are well-aligned and reliable.

Table 3. Cronbach's Alpha Reliability Coefficient

Reliability Statistics		
Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of items*
	.889	*9*

Teachers from the control and experimental groups jointly conducted a lesson on the topic of "Gas and Liquid Pressure" using different methodologies. Before the lesson, the

students' level of knowledge and skills was assessed, and a test was administered again at the end of the lesson.
Figures 1 and 2 show the assessment scores of the students' knowledge and skill levels before and after the lesson, respectively.

Figure 1. Assessment score indicators of the control group students' performance levels

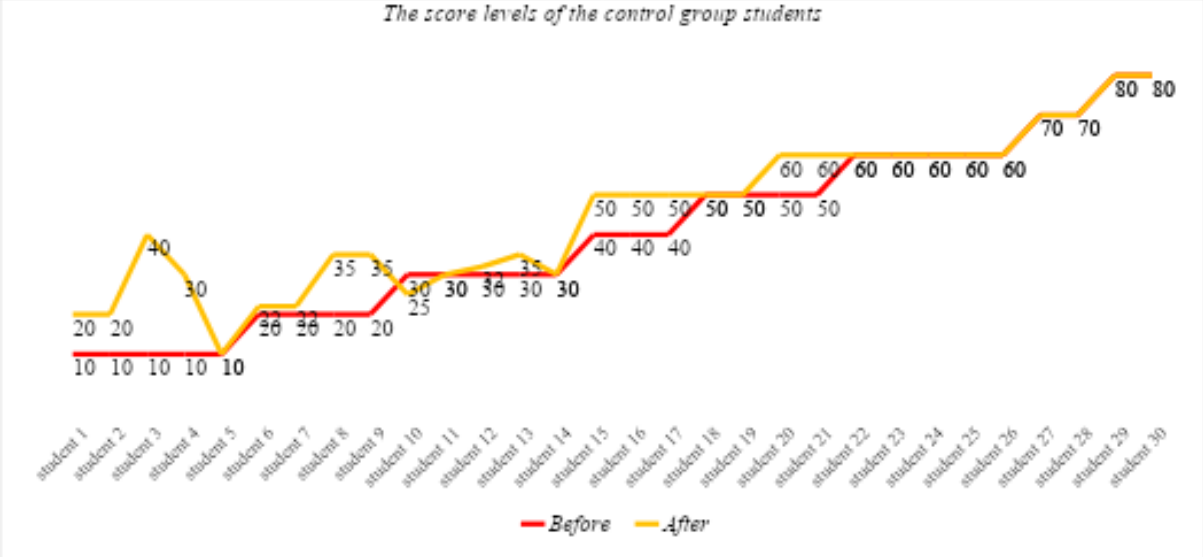
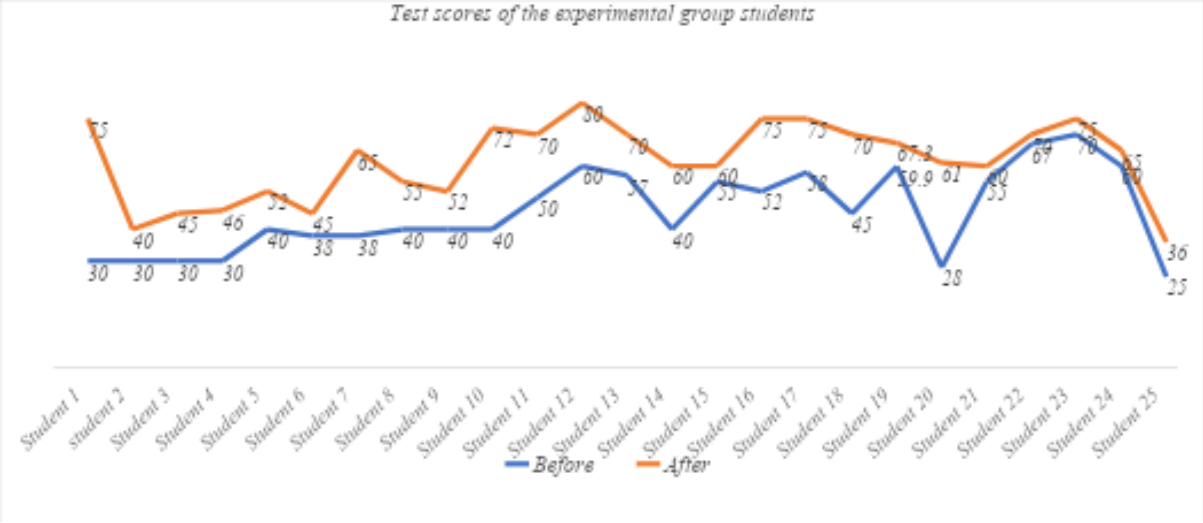


Figure 2. Assessment score indicators of the experimental group students' performance levels



In the Table 4, the standard deviation of the 25 students in the experimental group has not increase significantly, while the average test score improved from 45.51 before the experimental lesson to 61.51 after the lesson.

Table 4. Average assessment scores of the experimental group students

	Mean	*N*	*Std. Deviation*	*Std. Error Mean*
Before the experiment	*45.5160*	*25*	*15.25169*	*2.99110*
After the experiment	*61.6520*	*25*	*15.02939*	*2.94751*

Table 5 presents the results of the Paired Sample t-test for the assessment scores of students in both experimental and control groups. With a 95% confidence level, the results show a Sig. (2-tailed) = P-value of 0.0000, rejecting the null hypothesis—indicating the experimental lesson was successfully conducted. The mean assessment scores increased while

the standard deviation decreased. Additionally, the range between maximum and minimum values has narrowed.

Table 5. Comparison of Scores Between Experimental and Control Groups

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-test and Post-test (Experimental Group)	-16.13600	10.96813	2.15103	-20.56612	-11.70588	-7.502	25	.000
Pre-test and Post-test (Control Group)	-6.20000	8.82551	1.61131	-9.49550	-2.90450	-3.848	30	.001

Conclusion

The study sample of 55 students revealed 29.09% with predominant bodily-kinesthetic intelligence and 21.81% showing interpersonal intelligence traits, indicating the efficacy of intelligence-specific pedagogical approaches. The psychometric properties of the intelligence assessment instrument were established, demonstrating both reliability and validity. Presents a Cronbach's Alpha coefficient of .889, confirming strong internal consistency across all nine measurement items.

The experimental lessons revealed intelligence-specific competencies: Students with logical-mathematical intelligence predominance excelled in hypothesis generation and experimentation, those with visual-spatial strengths performed better in diagrammatic presentations, verbally-oriented learners effectively articulated group work processes, kinesthetically-inclined students outperformed in physical demonstrations. This evidence supports differentiated instruction based on cognitive profiles.

The results of the assessment test for the control and experimental groups show that the average scores before and after the experimental lesson were 45.51 and 60.65, respectively. Also, the results of the Paired Sample t-test show that the Sig.(2-tailed) = P-value is 0.0000, which means that the null hypothesis is rejected. Therefore, it can be seen that the experimental lesson is effective. Paired Sample t-test results of the scores of the experimental and control group students are shown. The confidence level is set at 95% and the results show that Sig.(2-tailed) = P-value 0.0000, which means that the null hypothesis is rejected, indicating that the experimental lesson was successful. The mean score of the test increased and the standard deviation decreased. The gap between the maximum and minimum values also decreased.

Successful learning methods based on intellectual characteristics are: Linguistic intelligence - brainstorming, reading, students speaking, writing articles and essays, developing vocabulary, recording, writing book content, creative writing, writing reports, publishing, making wall magazines, memorizing, developing through questions. Logical-mathematical intelligence - Critical thinking methods, Socratic method, analysis, calculation, rational thinking, comparison, experimentation, problem solving, classification, KWL method. Musical intelligence - Talking, listening to music, podcasts, listening, explaining and discussing the content of the lesson, making videos. Visual-spatial intelligence - Viewing pictures, graphs, infographics, interpreting symbols, photographs, watching videos/movies, watching comics, drawing/illustration, imagining, designing, brainstorming, collage techniques, Venn diagrams. Bodily-kinesthetic intelligence - Travel, excursions, drama, demonstrations, role-playing, teamwork, storytelling, moving around, practicing, sports games, dancing. Interpersonal intelligence - Interacting with people, teamwork, group work, teaching friends and peers, helping, getting advice from others, making corrections, making presentations, group

discussions, interviews, team projects, talking in pairs. Existential intelligence - Meditation, quiet environment, questions about the meaning of life and death, philosophical conversations, making judgments about situations. Naturalistic intelligence - Observation, learning materials, environment, processing information, activities related to the environment, classroom conditions, responsibility for nature, animals, and plants. Intrapersonal intelligence - Working in a quiet environment, doing solo tasks, free choice time, self-reflection, reflective tasks, rehearsals, goal-setting sessions, journaling, reading books, watching video tutorials, and observing.

Discussion

Based on the research findings, integrating specialized subjects with general education courses in TVET schools is more effective and saves time. Additionally, students benefit from improved teamwork, problem-solving, and self-expression skills, while their creative thinking abilities are enhanced, bringing them a step closer to becoming global citizens.
Furthermore, implementing teaching methodologies tailored to students' diverse needs is more effective, and it would be beneficial to increase and expand the number of students participating in the training.

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The Effect of Emotions on L2 Learning Outcome in University Students

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Abstract. Emotions are known to have a profound effect on learning where positive emotions can improve language learning and negative emotions may impair it. However, it is not clear how emotions alter second language (L2) learning in Mongolian students. This study aimed to investigate the effect of momentary emotions on English performance in Mongolian students. In this experimental study, Mongolian student volunteers viewed videos with various emotional contexts that exhibit positive, negative and neutral contents in their native language. The students were surveyed on momentary subjective feelings by using positive and negative Emotions schedules (PANAS). The L2 performance levels were assessed using L2 reading tests immediately and after one month post-experimentally. The results showed that negative emotions significantly reduced L2 test scores immediately after the experiments, but not in one-month post-test. Differently, positive emotions did not have an immediate effect on L2 performance but significantly improved exam marks in one month after the experiment. These indicate that, while negative emotions can have an immediate negative effect on L2 performance, positive emotions have a long-lasting effect apparent even after one month. To conclude, this interdisciplinary study showed that psychological well-being can significantly Emotions second language learning outcomes in Mongolian students. In the future, educational programs that incorporate and promote emotional positivity can benefit L2 learning in university students.

Keywords: *second language learning, positive emotions, negative emotions, PANAS*

Introduction

An association of students' emotions to their task performance is becoming an important research topic in language studies nowadays. While positive and negative emotions play crucial roles in cognitive appraisals of language learning, improving emotional balance and emotional intelligence may advantage educational outcomes of L2 learning.

Emotions and well-being

Emotions are defined as mental processes that involve appraisals of subjective experiences and action tendencies. They are inherently linked to behavioral elements, including but not limited to: physiological reactions, and facial and vocal expressions in response to emotion-eliciting stimuli (Reisenzein, 2007). Mainly, two types of emotions are identified: positive and negative emotions, from which positive emotions refer to the pleasantness of experiences while negative emotions involve unpleasant feelings (Watson et al., 1988). While both positive and negative emotions have functional roles for psychological well-being, an excess of them, especially negative emotions, can impair of psychological functioning and well-being.

Excessive and prolonged negative emotions such as worry and fear can become a cause for anxiety disorders. Anxiety, if not attended to, may impede not only social relationships and psychological well-being (MacIntyre & Gardner, 1994) but also L2 learning and academic performance (Horwitz, 2001). Essentially, anxiety in L2 learning is known to diminish self-confidence and willingness to communicate, thus, compromising the academic performance of linguistics students. In the cognitive realm, anxiety can divert attention and consume cognitive resources that could otherwise be utilized during the input, processing, and output stages (MacIntyre & Gardner, 1994). While the affective well-being of students is imperative for their academic success, there are no studies on the emotions of L2 learners in Mongolia.

Nonetheless, emotions are complex and deep cognitive processes of the Brain that affect attention, memory and understanding of L2. Language anxiety, associated with negative emotions of fear and worry, narrows down attentional focus during L2 tasks, while positive emotions broaden attention and improve perception of linguistic contents (MacIntyre & Gregersen, 2012). The effect can be explained by Barbara Fredrickson's *Broaden and Build Theory* where positive emotions can improve cognitive thought-action repertoire which further enhances exploration and creativity mindset. The theory also states that people with higher positive emotions can better utilize their intellectual, psychological and communication resources. On the opposite, negative emotions narrow the mindset and focus behavioral actions to "fight or flee mode" (Fredrickson, 2004). Thus, it is possible that the adverse effect of language anxiety on L2 learning, observed by MacIntyre & Gregersen (2012) can be due to a narrowed mindset and attention which decreases students' ability to use their cognitive reserve, creativity and exploration.

Besides anxiety, prolonged negative emotions are linked to cardiovascular health issues, stress, depression, aggression, violence, eating disorders and suicide, in extreme cases. In excess, some positive emotions can also lead to addictions (Fredrickson, 2004). Therefore, a balance of emotions is the key to physical and psychological well-being, as well as academic performance, particularly in L2 learning.

Role of emotions in second language (L2) learning

Most emotion studies highlight their significance but often undervalue their role in second language (L2) learning and social communication (Prior, 2019). The field of positive psychology identified the subtlety and complexity of positive and negative emotions in the language learning process which are dynamic. For example, positive emotions can improve academic productivity at school by broadening students' cognitive abilities, improving physical health and increasing happiness and self-esteem. On the other hand, negative emotions reduce self-confidence and increase dissatisfaction in learning and impulsive behavior, which have adverse effects on mental processes during L2 learning (Boudreau et al., 2018; MacIntyre & Gardner, 1994). This indicates that emotions impact L2 learning by influencing cognitions, well-being and behaviors.

The behavioral outcomes incorporate task performance and academic success in the case of linguistics students. Weiner (1985) proposed an *Attributional Theory of Achievement Motivation and Emotion* which states that an expectancy of academic success causes negative emotional experiences such as anger, gratitude, guilt, hopelessness, pity, pride, and shame. These emotions may diminish motivation to study and influence academic performance. The emotions exerted during learning can have foundations in two temporal dimensions: prospective (the future) and retrospective (the past). While *prospective outcome emotions* such as hope and anxiety are associated with possible success and failure in the future, *retrospective outcome emotions* such as pride and shame are elated to prior success and failure (Weiner, 1985). Emotions can be related to specific academic tasks, commonly to tests, a phenomenon known as *Test anxiety* (Zeidner, 1998). While the concepts of the *Attributional Theory of*

Achievement Motivation and Emotion and *Test anxiety* can explain how negative emotions may disadvantage L2 learning and task performance, the *Broaden and Build Theory* gives an insight into how positive emotions may advantage L2 learning (Fredrickson, 2004). Together, the above theories suggest that positive emotions have beneficial effects on learning, while negative emotions have adverse effects.

In controversy, Pekrun et al. (2002) suggested that the effects of negative and positive emotions are not exactly clear-cut "black and white". Not the positive and negative emotions *per se*, rather, the various combinations of negative and positive emotions are related to academic achievements. It is their diversity that benefits students' learning motivations and strategy, as well as the ability to use their cognitive resources and behavioral control for learning. A great variety of emotions were identified in the students and those are: various combinations of positive emotions such as joy, hope, pride and relief, as well as negative emotions such as anger, worry, shame, hopelessness and boredom. The authors measured them as *academic emotions* that are key to academic success (Pekrun et al., 2002). However, Pekrun et al. (2002) studied only 9 emotions while there are many other emotion types that, together, could better define affective psychological well-being in terms of L2 learning.

Measurement of emotions in this study

A well-known Positive and Negative Affective Schedules (PANAS) survey can reliably assess 20 positive and negative emotions (Watson et al., 1988), providing more complete list of ten positive and ten negative emotions. Given that a variety of emotions is crucial for studying academic success (Pekrun et al., 2002) and test performance (Zeidner, 1998), it is imperative to investigate how the PANAS 20 emotions (Watson et al., 1988) can alter L2 learning outcome to further address the controversies on emotions research and theories.

This study aimed to explore the association between momentary emotions and L2 learning outcomes and to understand how positive or negative emotions affect academic performance in linguistics students. It was hypothesized that students' positive emotions will increase L2 task performance, while negative emotions will decrease L2 task performance.

Methods

Participants

The participants were over three hundred Mongolian students at Years 1 and 2 of English course and had an intermediate level of English proficiency. The study was advertised through the university's social media and informed written consent was obtained from all the volunteers before the study. The surveys were distributed during their usual study term by using *Google Forms*. The study was approved by the UH academic committee and conducted in accordance with the ethical standards of the 1964 Helsinki Declaration and its later amendments.

The study had three independent groups: 1 - neutral video control group, 2 - negative video experimental group, and 3 – positive video experimental group. The participants were randomly assigned to the groups and formed classes that watched the corresponding videos which were prepared and validated prior to the experiments. After the videos, the participants were immediately surveyed on the valency and arousal of the viewed videos (the control variables, CV) and emotions were measured as stated below.

Measurements

Emotions were determined using a 20-item Positive and Negative Emotions Schedule, PANAS (Watson et al., 1988) and represent the independent variables (IV). The participants were asked "How do you feel right now?" The PANAS consisted of 10 positive and 10 negative emotions

scored on a 5-point Likert scale: 1 = very slightly or not at all, 2 = a little, 3 = moderately, 4 = quite a bit and 5 = extremely. The highest scores indicate the strongest experience of emotions. The overall positive Emotions scores equal to or below 25 are considered low, 26-40 as medium, and 41-50 as high levels. The overall negative Emotions scores equal to or below 10 are considered as low, 11-24 as medium, and 25-50 as high levels.

The experimental videos were evaluated for their emotional valency and arousal. The valence had three answer levels: 1- negative, 2 - neutral and 3 - positive. The arousal had seven levels in Likert scale: 1 - very negative, 2 - negative, 3 - slightly negative, 4 - neither negative nor positive, 5 - slightly positive, 6 - positive, 7 - very positive.

Two types of English (L2) reading tests were conducted after the experiments to determine the levels of comprehension and cognitive evaluation of written passages and represent the dependent variables (DV). The first test was taken immediately after the experiments ("L2 tests" from here on), and the second was taken a month after the experiments during their usual final term exams ("L2 exam" from here on). The immediate L2 test scores were measured as DV1 and the L2 exam scores - as DV2.

Data analysis

The analyses were performed on SPSS statistics software (IBM SPSS Premium Pack, Version 28.0.1.1). No missing values were detected. No outliers were detected with Z scores below or above ±3.29 as suggested elsewhere (Tabachnick et al., 2013). Pearson product-moment correlational analyses were performed to detect associations between the variables. Multivariate analysis of variance, or MANOVA, was used to determine the between group differences. A familywise error rate of .05 and Sidak's pairwise comparisons were used. The normality assumption was met and the Levene's homogeneity test was satisfactory (insignificant). Partial eta squared ($|_{p^2}$) was calculated to evaluate effect sizes, with $|_{p^2} > .01$ indicative of a small effect, $|_{p^2} > .06$ as a medium effect, and $|_{p^2} > .14$ as a large effect.

Results

As expected, the participants' evaluations of video valence and arousal levels corresponded to the induced momentary emotions. As such, the students who viewed videos with negative content had significantly higher negative emotions, while the students who viewed videos with positive content had significantly higher positive emotions in comparison to the other groups. This indicates that the experimental videos with either negative, neutral or positive contents successfully induced the expected emotions.

Bivariate Pearson's correlational analyses yielded significant correlations between the emotions and L2 test results. Negative correlations between the momentary negative emotions and the immediate L2 test scores were significant. Alternatively, positive emotions had significant positive correlations with the term exams that were taken a month after the experiments. However, the momentary negative emotions were not associated with the delayed L2 exam scores.

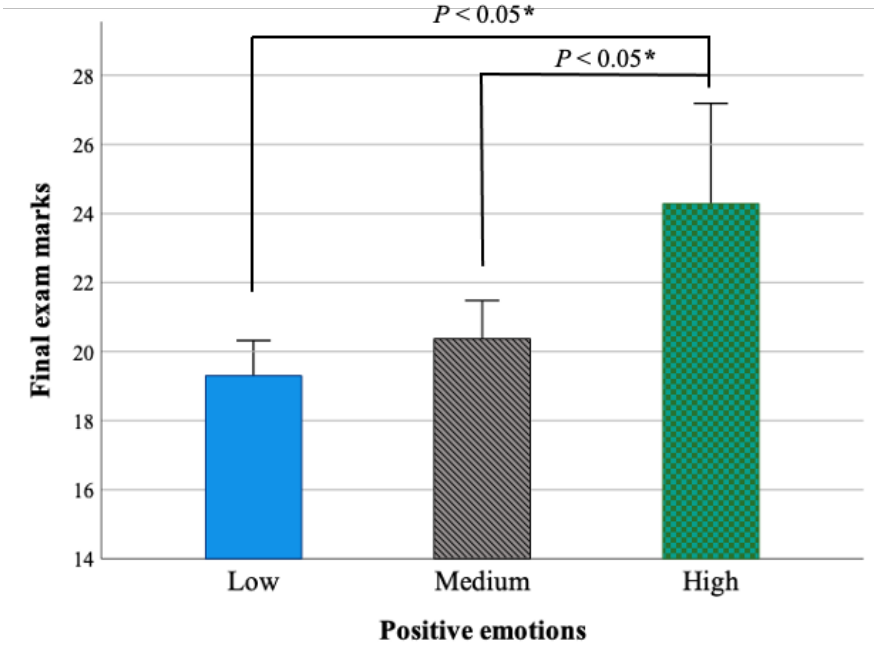
Further between-groups MANOVA comparisons confirmed the correlation results and showed that the momentary emotions also had a significant effect on exam marks. In detail, the student who had high positive emotions on the experiment day performed better on the final exam one-month post-experiment, in comparison to those who had low or medium levels of positive emotions (**Figure 1**).

In opposite, negative emotions had short-lived immediate effects on L2 test scores. As such, negative emotions significantly reduced L2 test scores on the day of experiments when the L2 tests were taken immediately after the video viewings. As such, the students with high negative emotions had significantly lower test scores, in comparison to those who had lower negative emotions (**Figure 2**).

When cognitive positivity was assessed by using subjective evaluations of watched videos, those who evaluated positive videos as "positive" rather than "neutral" had significantly higher L2 exam marks one month after the video viewing. This indicates that the cognitive-evaluative positivity of the students had a long-lasting effect on L2 learning outcomes (**Figure 3**). Together, the results showed that negative emotions had a rapid adverse effect on L2 learning outcomes, whereas positive emotions and cognitive positivity (to the videos) had an enduring beneficial effect on the English learners.

Figure 1

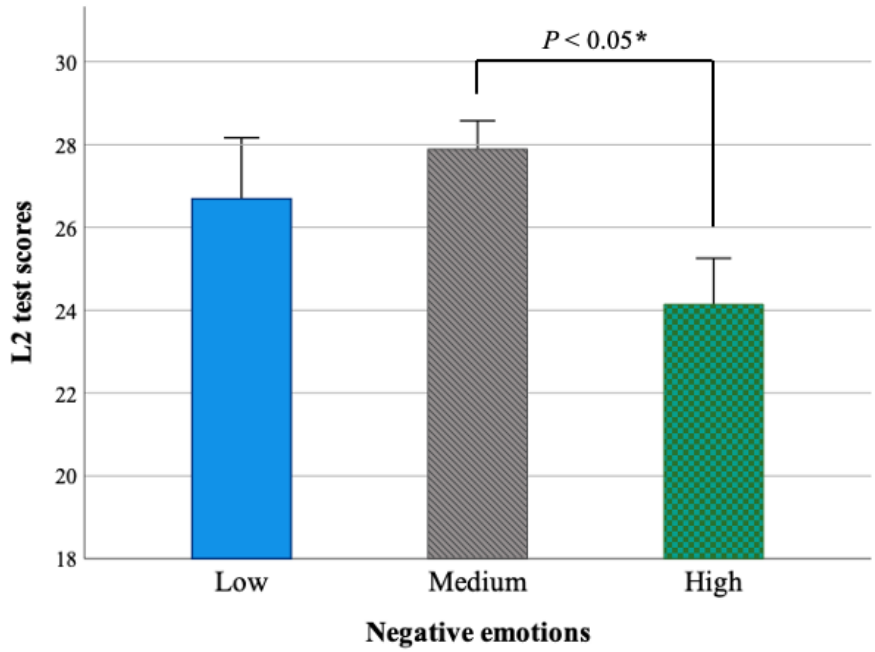
L2 final exam marks and momentary positive emotions



Note. The figure demonstrates means of term final exam marks taken one-month post-experiment. The positive emotions were evaluated on immediately after the experiment (Day 0) and represent low, medium and high levels according to PANAS (Watson et al., 1988).

Figure 2

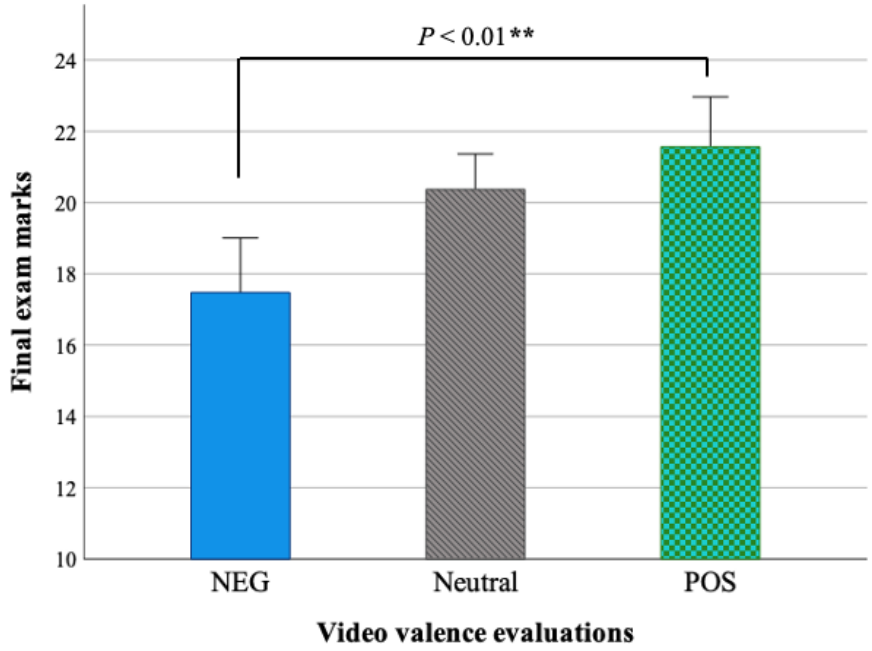
L2 test scores and negative emotions



Note. The figure demonstrates means of L2 test scores taken on immediately post-experiment (Day 0). The negative emotions were evaluated immediately after the experiment (Day 0) and represent low, medium and high levels according to PANAS (Watson et al., 1988).

Figure 3

L2 final exam marks according to the video evaluations



Note. The figure demonstrates means of term final exam marks taken one-month post-experiment. The video valences were evaluated immediately post-experiment (Day 0). NEG represents negative evaluations, Neutral - neither negative nor positive, POS - positive.

Discussion

The current study results confirmed the proposed hypotheses and shows that positive emotions increased the outcomes of L2 learning, while negative emotions decreased the performance. To date, this is the first study to experimentally investigate the effects of 20 momentary emotions on L2 learning outcome. This study is also the first to evaluate emotions in Mongolian English-learning university students.

In this study, 20 emotions were evaluated using PANAS (Watson et al., 1988), which is well-validated across many cultures and measures a wide variety of positive and negative emotions. The two-factor model of emotions, including the dimensions of positive and negative valences, was first proposed by Watson and Tellegen (1985) and is now widely used in affective psychology. For instance, while high levels of positive emotions are represented by feelings of enthusiasm, activity, and alertness, low levels are associated with sadness and lethargy. On the other hand, high levels of negative emotions encompass feelings of distress, aversion, anger and fear, whereas low levels result in calmness (Watson & Tellegen, 1985). In addition, this study extended this knowledge by investigating ten positive and ten negative emotions in Mongolian linguistics students. Interestingly, positive and negative emotions had a different temporal impact on the English test performance of the students.

State positive emotions have long-lasting beneficial effects on L2 learning outcome

Momentary positive emotions in our participants showed not the short-term, but the long-term benefits. As such, the students with high positive emotions had significantly higher final exam marks one month after the emotion-inducing experiments, compared to those who had low-to-medium levels of positive emotions. This long-lasting effect can be explained by the *Broaden and Build Theory* according to which positive emotions enhance human cognitive resources and have an extended effect on psychological resilience (Fredrickson, 2004). Therefore, the sustained effect of positive emotions on learning performance even after one month can be due to the profound cognitive processes that benefited from the affective positivity of the students.

The other roles of emotional positivity in learning can be due to improvements in cognitive abilities, physical health and psychological well-being of L2 learners (Boudreau et al., 2018; MacIntyre & Gardner, 1994), if to assume that the momentary positive emotions measured in our students are reflections of their traits and personality. Others have shown that emotions can be shaped by personality traits and a personality trait such as neuroticism was negatively associated with both state (i.e., momentary) and trait-positive emotions in UK undergraduate students (Shotton, 2021). Thus, it is possible that the most successful L2 learners in this study had high positive emotions as a momentary display of their personality and trait positivity while personality traits are generally known to be enduring personal qualities.

Negative emotions exert an immediate negative effect on L2 performance

In opposite to positive emotions that left long-lasting advantages, negative emotions gave fast-appearing and short-lived disadvantages to L2 performance. In comparison to those with less negative emotions, the students with high negative emotions had significantly worse L2 test scores when examined on the day of emotion-inducing experiments, but not a month later. This can be because negative emotions are often more salient and potent than positive emotions (Taylor, 1991). Such an "asymmetry" can be the reason why emotional negativity quickly impaired L2 test scores in our participants immediately after viewing emotion-inducing videos.

The mechanism of such rapid adverse effects of negative emotions can be related to its strong capacity to be coded in human memory. Previous studies showed that negative emotional contents are more likely to be stored and recalled, in comparison to the words with neutral and positive meanings. This is because emotional stimuli provide a competitive

advantage in the memory processes associated with knowledge revision, attention, storage, retrieval and cognitive strategies, also called a "winner-take-more effect" (Mather & Sutherland, 2011). In our participants, the rapid negative effect of experimentally induced negative emotions on L2 performance can be due to a high emotional arousal which may have over-taken the memory load over the task. Overall, negative emotions can disadvantage L2 learning performance at least in the short term.

Cognitive-evaluative positivity has enduring benefits in L2-learning outcome

While positive emotions are related to the feelings of pleasantness, cognitive-evaluative positivity is different from positive emotions as it reflects a cognitive reappraisal of stimuli and is a part of a thought process (McGuire & McGuire, 1992). Thus, positive emotions define affective positivity, whereas evaluation of stimuli (video stimuli in our case) measures cognitive positivity. In addition to 20 positive and negative emotions, this study measured a cognitive evaluation of valence and arousal of the emotion-inducing videos by the participants. The results showed that the students who were more positive in the evaluations had significantly better marks on final exams one month after the experiments, compared to the less positive ones. This indicates that similar to momentary positive emotions, cognitive-evaluative positivity has a long-lasting advantageous effect.

The effects of emotional stimuli on learning are generally consistent with the effects of emotional states. In addition, combining positive emotions and learning positivity enhances memory. For example, reading for pleasure while learning promotes more elaboration and associations from long-term memory (Linderholm & van den Broek, 2002; Pekrun et al., 2002) (Linderholm & vanden Broek, 2002; Pekrun et al., 2002). Therefore, cognitive positivity has an intrinsic profound connection with thought and memory processes, thus, can be the reason why the students had a long-lasting improvement in L2 performance in this study.

Conclusion

While the positive emotions (PANAS) and cognitive positivity (video evaluations) of the students had enduring effects on L2 learning outcome, the adverse effect of negative emotions was rather instantaneous. Together taken, the results showed that negative emotions had a rapid adverse effect on L2 learning outcome, whereas positive emotions and cognitive positivity (to the videos) had an enduring beneficial effect in the English-learners.

In the future, emotional and cognitive positivity should be considered for long-lasting educational benefits. In opposite, the programs that involve awareness and regulation of negative emotions may offer prompt improvements of L2 learning outcome in university students.

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Using the Zeigarnik Effect in Training

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Abstract. Cognitive processes play a crucial role in learning. In education, effective outcomes can be achieved by utilizing the principles underlying these processes. One such phenomenon, the Zeigarnik effect—named after the psychologist who discovered it—refers to the tendency for incomplete tasks to be retained in memory more effectively than completed ones. This study investigates the application of the Zeigarnik effect in improving students' ability to retain, recall, and utilize complex academic content. The results indicate that incorporating this cognitive principle into pedagogical practices significantly enhances long-term memory retention and academic performance.

Keywords: *memory, cognition, retention, recall, incomplete tasks, educational psychology*

Introduction

Education encompasses more than the acquisition of factual knowledge, yet it is underpinned by a foundation of established facts, theories, and concepts stored within semantic memory. Human memory is integral to learning, cognition, and personal development, providing the basis for acquiring and applying knowledge, skills, and habits (Санжжав, 1990). Memory performance is influenced by capacity, speed, accuracy, and accessibility (Крысько, 2002). When things are identified, they are not stored separately, but are stored in a way that they enter into relationships and interactions with other things in the memory, becoming a component of the conceptual imagination there, or changing the structure of the elements there, entering into new connections with them (B, 2014).

However, increasing dependence on mobile technologies—particularly among the younger *Zeta* and *Alpha* generations—has been linked to a decline in attention span and memory capacity. These generations often exhibit characteristics such as reduced sustained attention, discomfort without digital devices, and disinterest in learning activities that fall outside their immediate interests. This global trend presents significant challenges for educators striving to enhance student engagement and learning outcomes. The main danger lies in the fact that the dependence on screens, mobile phones, and electronic games not only weakens even the most basic human thinking skills, but also has a particularly bad effect on two closely related key mental processes, attention and memory, which are considered the gateway to cognition. How successfully we establish, retain, recognize, and recall information directly depends on how much attention we pay to it (U, 1967).

Despite the evolving educational landscape, human cognitive processes remain governed by stable psychological laws that can be leveraged to improve instructional strategies.

It is essential that insights from cognitive science are not only studied but also actively applied in educational settings.

Literature Review

Research on human memory began in earnest in the late 19th century. Hermann Ebbinghaus pioneered experimental memory studies in 1878 with his seminal work *Memory: A Contribution to Experimental Psychology*. William James, in 1890, introduced the distinction between short-term and long-term memory in *Principles of Psychology*. Elizabeth Loftus later explored memory distortions and the reliability of eyewitness testimony (Аткinson.S, Tomley S, 2012).

Memory research gained renewed interest following World War II during the cognitive revolution (Аткinson.S, Tomley S, 2012). Influential contributions included Alan Turing's theoretical work on thinking machines (1950), and George Miller's (1956) findings on short-term memory capacity—famously described as "The Magical Number Seven, Plus or Minus Two." Jerome Bruner in the 1960s highlighted the importance of memory in educational structure.

Since the 1970s, attention has been focused on the role of forgotten memories in learning and memory (Батсайхан. Б, Дэлгэржав. М, 2013). Endel Tulving's (1972) work distinguished episodic, semantic, and procedural memory, emphasizing that each is stored in separate neural systems. Gordon Bower (1981) established the link between emotions and memory, showing that mood-congruent information is more easily recalled. Daniel Schacter's (2001) *The Seven Sins of Memory* further explored common memory failures (Аткinson.S, Tomley S, 2012). It is more effective if the subject is associated with positive emotions (Гейвин, 2003). Also, things that particularly move the mind are not forgotten.

Further, researchers have discovered that how well information is stored depends on the nature of its stimulus (Б.Ф, 1986), that strange things that make a very special impression are easily stored, and that simple things are easily stored because they do not have a complex structure in the mind of each person (Дружинин В.Н, 2016), that as the number of things to store increases, the number of repetitions that must be performed during storage increases (Фаликман. М, 2011), that the first and last parts of long information are stored somewhat better, that human actions and thoughts are more easily stored than the meaning of things (Андерсон.Ж, 2002), and that information that is properly expressed in words is stored faster and more deeply than information received through the visual and auditory organs (Hill, 2016).

Collectively, these findings have laid the groundwork for understanding how memory functions in learning contexts and the factors that influence its reliability and effectiveness.

Methodology

In 1927, Russian psychologist Bluma Zeigarnik observed that waiters remembered unpaid orders more accurately than completed ones. She concluded that incomplete tasks are retained in memory more effectively than completed ones—a phenomenon later named the *Zeigarnik effect* (Аткinson.S, Tomley S, 2012). After discovering this, Bluma Zeigarnik conducted a number of experiments that confirmed the above discovery. If there are correctly formulated questions that involuntarily require reflection and search, that is, if there is something

unresolved and unfinished, then the information about it is stored more deeply and is recalled in full (Sternberg, 2005).

This effect is believed to be associated with the prefrontal cortex, which governs attention and decision-making. Neurochemical responses, particularly involving dopamine, are triggered by incomplete tasks, enhancing focus and motivation to complete them. The Zeigarnik effect is likely due to the successful recall of things that fall within the scope of human actions, rather than the scope of their means (P, 1996). It is also related to the fact that things related to a person's own needs, motivations, interests, goals, and attitudes are easily identified (Keane, 2020).

As a teacher, I thought if the human mind has such a unique feature, how could it be used effectively in training? So this is how I used the Zeigarnik effect in training.

This study explored the application of the Zeigarnik effect in higher education, specifically within the course *History of Thinking*, a philosophy subject widely considered challenging among students of the humanities. The research was conducted during the fall semester of the 2024–2025 academic year at UH, with a participant group of 248 students.

For effectively utilize the Zeigarnik effect in educational settings, it is important to consider two key contextual factors. First, certain topics within the Philosophy curriculum present significant challenges for students. The course comprises 15 lecture topics, with both progress and semester examinations assessing comprehension within this framework. Data from the previous academic year reveal a consistent trend: students perform below average on questions related to five specific topics—namely, Theory of Knowledge, Theory of Justification, Basic Issues in the Philosophy of Science, Research Methodology, and Statistical Processing Methodology (see Table 1). This pattern has remained stable over successive years despite repeated modifications to the questions. Notably, the underperformance on these topics is not due to the exam format but rather reflects the inherent difficulty of the content. While the topic of Statistical Processing Methodology could potentially be removed, the remaining four are considered essential for a comprehensive understanding of philosophy and, therefore, cannot be excluded from the curriculum. Second, to enhance student engagement and academic performance, a gamified instructional strategy was implemented beginning in the 2023–2024 academic year. Using the Kahoot platform, students participated in interactive question-and-answer sessions at the start of each seminar. This approach not only encouraged active participation but also awarded bonus points contributing to students' final semester grades. This initiative reflects an effort to improve outcomes through increased motivation and formative assessment, particularly in areas historically associated with lower performance.

During the fall semester of the current academic year, the seminar was conducted in a similar format. To specifically examine the Zeigarnik effect, a condition was intentionally created in which a task remained incomplete for the primary target group of the effect. This was operationalized by withholding Kahoot quizzes on the five topics with the lowest overall student performance. These topics were not assessed through quizzes until the final exam period. Students were informed that quizzes would be administered on all topics and that any missed quizzes could be completed before the end of the semester. They attended seminar sessions with the expectation of answering questions, completing tasks via the Kahoot application, and receiving scores. The instructor anticipated that students would attempt the postponed quizzes prior to the final exam, regardless of performance, since making it explicitly known that no quizzes would be held for those topics would render the task psychologically

complete. By withholding the quizzes while maintaining the expectation of their completion, a deliberate state of cognitive incompletion was created, thereby eliciting the Zeigarnik effect.

Results

The first post-intervention assessment revealed significant improvements. For example, the *Theory of Knowledge* topic, which had previously recorded low correct-answer rates (34.3% and 27.3%), showed an increase to 62.3%, placing it among the top three most correctly answered topics (Table 2).

In the second phase of testing (Table 3), the topics *Theory of Justification* and *Basic issues in the Philosophy of Science* displayed relatively lower correct response rates, suggesting variable influence of the Zeigarnik effect across content areas.

However, final exam results (Table 4) demonstrated notable improvement. Topics previously associated with poor performance, such as *Research Methodology*, achieved significantly higher scores (e.g., 53.4%), indicating lasting effects of the intervention. *Cognitive Theory*, studied early in the semester, achieved a remarkable correct-answer rate of 72.7%, suggesting durable retention facilitated by the Zeigarnik effect.

Tables and figures

Table 1. 2023-2024 Academic Year Fall and Spring Semester Exam Results

№	***Lesson topics***	***Average percentage of correct answers to questions asked within the subject area in the fall exam***	***Average percentage of correct answers to questions asked within the subject area in the spring exam***
1	Average score of correct answers on the exam	40,0	41,0
4	Theory of Knowledge - Epistemology	34,3	27,3
11	Theory of Justification	38,4	39,6
12	Basic Issues in the Philosophy of Science	35,4	39,7
13	Methodology of Scientific Research	33,9	34,4
14	Methodology of Statistical Processing	39,5	37,2

Table 2. 2024-2025 fall semester /Progress exam-1

№	***Lesson topics***	***Number of questions***	***Average percentage of correct answers***
1	The Main Issues of Philosophy	7	65,6
2	The Problem of the Originator-Ontology	8	52,1
3	The Meaning of life	6	46,5

4	Theory of Knowledge - Epistemology	8	62,3
5	The Nature of Ethics and Morality	6	50,7
6	Eastern Ethics	6	53,3
7	Western Ethics	6	68,2

Table 3. 2024-2025 spring semester /Progress exam-2/

№	**Lesson topics**	**Number of questions**	**Average percentage of correct answers**
8	The Study of logic and Concepts	7	49,6
9	Thought and the laws of logic	6	46,2
10	Inference	6	40,1
11	Theory of Justification	7	52,2
12	Basic Issues in the Philosophy of Science	7	59,4

Table 4 2023-2024 Academic Year Fall Semester Exam Results

№	***Lesson topics***	***Number of questions***	***Average percentage of correct answers***
3	Average score of correct answers on the exam	30	54.0
4	The Theory of Knoweledge - Epistemology	6	72,7
11	Theory of Justification	6	75,0
12	Basic Issues in the Philosophy of Science	6	72,3
13	Methodology of Scientific Research	6	53,4
14	Methodology of Statistical Processing	5	81,0

Conclusion

1. The Zeigarnik effect, as observed in this study, presents significant potential for enhancing learning outcomes. Educators who integrate this cognitive phenomenon into instructional design can expect measurable gains in memory retention and academic performance.
2. The long-term retention observed in the *Cognitive Theory* topic suggests that the Zeigarnik effect can sustain memory over extended periods, not just immediately following instruction.
3. Results also align with the serial position effect, whereby information presented at the beginning and end of a learning sequence is more likely to be retained, supporting the broader cognitive framework influencing memory performance.

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Result of the Study to Assess the of University Teachers' Job Attitudes Using "Robbins and Judge's Model"

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Abstract. In this research, the methodology of evaluating job attitude has been studied in the organizational behavior theory. Job attitudes are the feelings employees have toward different aspects of the work environment. The research methodology was based on the theory of Robbins & Judge (2003) model of job attitude. Robbins difined that job satisfaction, job involvement and organizational commitment are three key attitudes that are the most relevant to important outcomes. The aim of this study was to assess the of university teachers' job attitude using Robbins & Judge (2003) model and analyze it in terms of their age, gender, work experience, educational degree, level of teaching and job position category. For the purpose of this study, data collection was done through the questionnaire and reliability of the items was confirmed. Further, 406 respondents were selected based on convenient sampling method from teachers of MUST. SPSS was used to analyze the data and statistical tools such as descriptive statistics analysis and regression, reliability analysis were applied to measure the relationship between variables.

Keywords: *Job attitude, job satisfaction, organizational commitment, job involvement, teachers' job attitudes*

Introduction

Quality education is the key factor for overall development of an individual and nation. Quality of education is directly related to the teachers' job attitude, as teacheris the main implementor of the educational program. Teachers cannot do well on teaching profession unless they have a positive attitude towards their profession and are not satisfied with it. This study reveals that a significant number of teachers are not satisfied with their profession and do not have a positive attitude towards it.

Hellfritzsch (1945) demonstrate the importance of attitudes towards teaching almost 80 years ago. (Hellfritzsch, 1945). Recently, Stronge (2002, as cited in Casey and Childs, 2007) has shown the attitudes like caring, fairness, respect for students, peers, parents and community, enthusiasm, motivation and dedication to teaching are necessary for pre-service teachers to become successful teachers. (Casey & Childs, 2007). Positive attitude is very important for students' learning outcomes and hence quality education (Pandey & Sagar, 2022). Attitude and beliefs drive classroom actions and influence the teacher change process (Nespor, 1987) (Pajares, 1992) (Richardson, 1994). Without positive attitude, teacher will not be able to succeed in his profession (Soibamcha & Pandey, 2016). Teachers' attitude, emotional reactions and habits affect the students' success and personality (Bloom, 1976) (Jeans, 1995)

(Brooks & Sikes, 1997) Research revealed that 91.2 percent believed that a positive attitude increased students' performance (Ulug, Ozden, & Eryilmaz, 2011)

Teachers' attitudes towards their work are examined from the perspective of organizational behavior science. Job attitudes examined through three criteria: job satisfaction, organizational commitment, and work involvement.

Literature review

Theoretical framework of Job attitude

Attitude as a mental or neural state of readiness, organized through experience, exerting a directive or dynamic influence on the individual's response to all objects and situations to which it is related (Allport, 1935).

Robbins & Judge (2003) defined attitudes as evaluative statements and they can be either favorable or unfavorable-concerning objects, people, or events. Therefore they reflect how one feels about something. The favorable statements may provide positive effects regarding the concerned object, person or event whereas unfavorable statement may provide negative effects. An attitude is a positive or negative feeling or mental state of readiness, learned and organized through experience that exerts specific influence on a persons' response to people, objects and situations. Job satisfaction, job involvement and organizational commitment are three key job attitudes that are the most relevant to important outcomes (Robbins & Judge, 2003).

In line with this information, the attitude towards the teaching profession can be explained as the person's thoughts about teaching, her or his feelings towards it, and her performance while teaching (Camadan & Duysak, 2010). Attitudes of teachers toward the profession it is often about the liking of the profession or the recognition that it is socially necessary and important. In addition, teachers' loyalty to the profession or their sense of belonging is related to their attitudes towards the profession (Ayık & Ataş-Akdemir, 2014).

Theoretical framework of Job satisfaction

Job satisfaction is a set of favorable or unfavorable feelings and emotions with which employees view their work. It is an affective attitude - a feeling of relative like or dislike toward something (Newstrom & Davis, 2002)

Job satisfaction is the function of the degree to which one's needs can be satisfied (Kuhlen, 1963) (Glimmer, 1966) and taken as a discrepancy between 'how much is there now' and 'how much there should be' (Wanous & Lawer, 1972). Teacher satisfaction is affected by intrinsic factors like students' characteristics and perceptions of teacher control over the classroom environment (Lee, Dedrick, & Smith, 1991) extrinsic factors like salary, perceived support from administrators, school safety and availability of school resources (Bobbit, Leich, & Whitener, 1994) and demographic factors like age, education, marital status and gender (Eichinger, 2000). According to Pii (2003), the factors that significantly related with job satisfaction are compensation, recognition, institutional policies and practices, working conditions, supervision and human relations (Pii, 2003) It has been identified that absenteeism, irregularity and lack of commitment are all effects of low job satisfaction (Nigama, Selvabaskar, Surulivel, Alamelu, & Joice, 2018)

Teacher job satisfaction is an essential component of the quality education and there are close correlations between them (Persevica, 2011). It is also related to teacher emotions (Erarslan, 2021), professional activity of the teacher (Persevica, 2011), teacher retention, well-being of teachers and students, overall school cohesion and enhanced status of the teaching profession (Toropova, Myrberg, & Johansson, 2020)

Theoretical framework of Job involvement

Job involvement refers to the process of engaging employees in their work and increasing their participation in decisionmaking .In particular, employee involvement ensures that employees who are closet to the work have the power to control work methods, and are able to use their knowledge and skills to improve work process (Lowler ,1992)

Job involvement relates to the technique of engaging workers in their job and developing their participation in decision- making. Li and Long (1999) define job involvement as the degree to which one show emotional or mental identification with his job (Li Ye & Long Lirong, 1999). Management needs to understand the importance of job involvement as it is one of the most important and essential elements of job behavior by the whole of the workforce as previous research had proven this phenomenon (Manojlovich & Laschinger, 2002). Workers with a high level of job involvement are strongly identified with, and they care about the kind of work they do. Job involvement is the magnitude to which employees deeply involve themselves in their jobs, invest their energy and time in them, and view work as a principal part of their general lives (Newstrom & Davis, 2002). Job involvement is the eagerness of a person to work hard and apply effort beyond normal job expectations (Wood, 1996)

Theoretical framework of Organizational commitment

Organizational commitment is a feeling of dedication to one's employing organization, willingness to work hard for that employer, and the intent to remain with that organization (Meyer & Allen, 1988).

Mowday, Porter, and Steers (1979) defined organizational commitment as the relative strength of an individual's identity within a particular organization. They describe organizational commitment as "the relative strength of an individual's identification with and involvement in a particular organization. That can be characterized by three elements: (i) a strong belief in and acceptance of the organization's goals and values, (ii) a willingness to exert considerable effort on behalf of the organization, and (iii) a strong desire to maintain membership in the organization (Mowday, Porter, & Steers, 1979)

Methodology

The research methodology was based on the theory of Robbins & Judge (2003) model of employee attitude and this independent variable was job attitudes consist with there three sub variable named; job satisfaction, organizational commitment and job involvement (Robbins & Judge, 2003). According to the model shown in Figure 1, job attitudes was studied.

Figure 1. Robbins and Jude's (2003) model of job attitudes

Data Collection Procedure

In our study, we developed a questionnaire (Appendix 1) to assess the teachers' job attitude on 3 criteria and 27 measurement indicators and evaluated it on a Likert scale, teachers were surveyed using Google Forms. Statistical analysis was performed using the SPSS Statistics 23 program on the survey data.

Data Analysis Methods

Quantitative and comparative analysis methods were used to develop the research results.

- Factor analysis
- Reliability Analysis (Cronbach's Alpha)
- Descriptive statistics analysis
- Regression

Demographic Analysis of the study participants

In the study, following demographic data used:

- Gender
- Age (by generation)
- Work experience at MUST
- Educational degree
- Job position
- Level of teaching
- Field of study

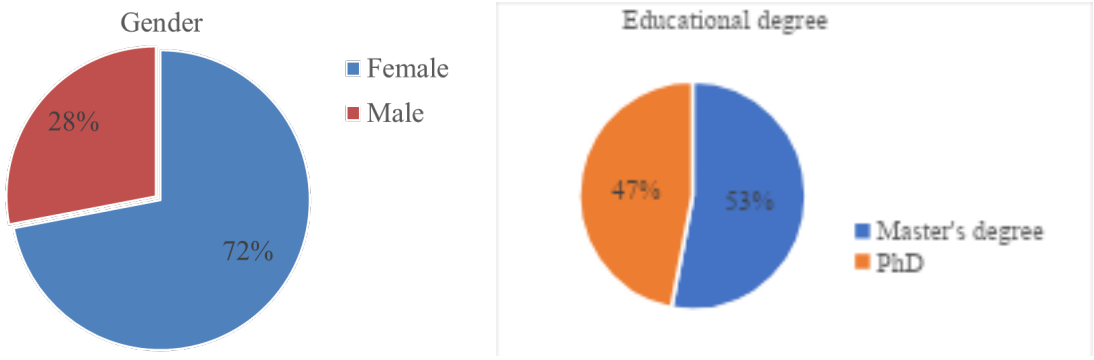
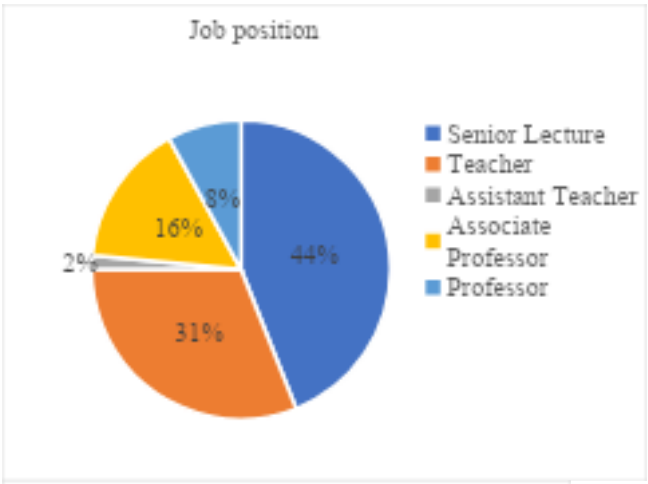
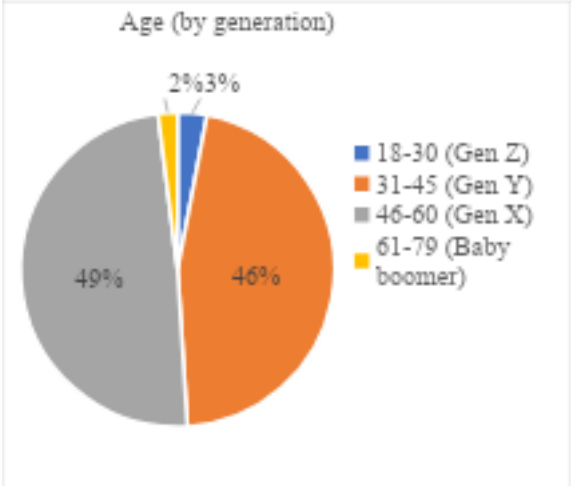


***Figure 2. Gender of teachers** (in percent)*

In the study participants, 72 percent is female teachers and 28 percent is male teachers. *(Figure 2)*

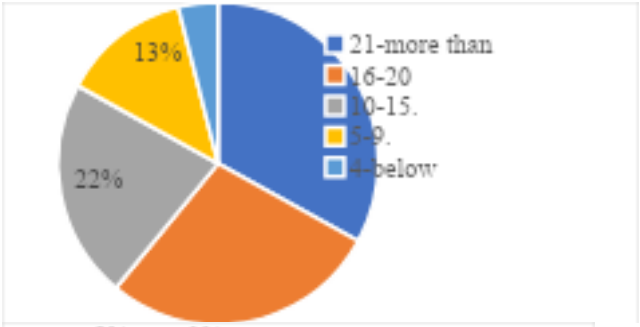
In the study participants, 53 percent is master's degree teachers, 47 percent had a doctoral degree teachers. *(Figure 3)*

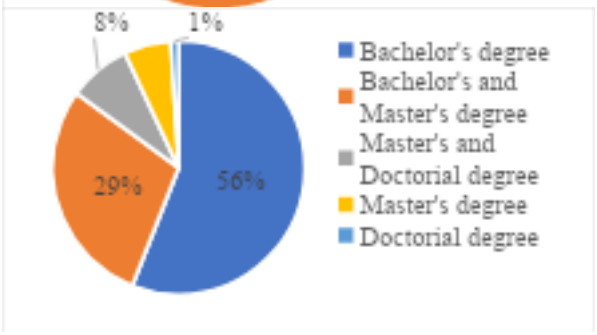




In the study participants, 44 percent is Senior lecturer, 31 percent is teacher, 15.5 percent is associate professors, 8 percent is professors, and 1.5 percent were assistant professors. *(Figure 4)*

In the study participants, In the study, 49 percent is generation X teachers and 46 percent is generation Y teacher are higher than the other. *(Figure 5)*





In the study participants, 33 percent is 16 more than years of teaching, 28 percent is 16-20 years of teaching and 22 percent is 10-15 years of teaching. *(Figure 6)*

In the study participants, 56 percent is teaching in the bachelor's degree and 29 percent is teaching in the bachelor's and master's degree. *(Figure 7)*

Factor analysis

The survey was conducted using a random sampling method. 406 teachers participated in the study. The Bartlett test showed a Sig or significance level of .000 and the Kaiser-Meier-Olkin /KMO/ criterion KMO=0.948, respectively, indicating sample adequacy. The detailed results of the sample adequacy analysis are shown in Table 1.

Table 1: Factor analysis

KMO тест		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.948
Bartlett's Test of Sphericity	Approx. Chi-Square	1699.530
	df	351
	Sig.	.000

Source: Developed by the researcher

The indicators belonging to the three groups of criteria are categorized and shown in Table 1, and only those values above 0.6 are considered, and 10 out of a total of 27 indicators are excluded as unqualified. The final outcome of the job attitude, which is the job satisfaction, job involvement, and organizational commitment, is determined to be three criteria and 17 measurement indicators.

Reliability Analysis (Cronbach's Alpha)

To measure the reliability of the survey questions on teachers' job attitudes, the analysis was conducted in detail for each criterion, and the results of the analysis are shown in Table 2.

Table 2: Reliability Analysis of the Job Attitude Questionnaire

Criteria	Number of questions	Cronbach Alpha	Mean
Job Involvement	9	.817	3.83
Job Satisfaction	9	.803	3.69
Organizational Commitment	9	.847	3.68
Job Attitude	27	.822	3.73

Source: Developed by the researcher

As shown in Table 2, To measure the reliability analysis of teacher's job attitude questionnaire, the Cronbach Alpha test was 0.822, indicating that there is consistency between the questions and significant reliability..

Descriptive statistics analysis

The results of the descriptive statistics analysis of the teacher's job attitude measuring indicators are presented in Table 3.

Table 3: Results of the descriptive statistics analysis of the teacher's job attitude measuring indicators

Measuring indicators	N	Mean	%	Std. Deviation	Variance
Job Involvement (JI)	406	3.83	76.6	.890	.832
Job Satisfaction (JS)	406	3.69	73.8	1.023	1.058
Organizational Commitment (OC)	406	3.68	73.6	1.034	1.084
Teacher's Job attitude	406	3.73	74.67	.982	.991

Source: Developed by the researcher

According to the results of the descriptive statistics analysis of the teacher's job attitude measuring indicators are presented in Table 3, show that "job involvement" is 76.6 percent, which is above average, while "job satisfaction" is 73.8 percent, and "organizational commitment" is 73.6 percent, which is below average.

The results of the descriptive statistics analysis of the teacher's job involvement measuring indicators are presented in Table 4.

Table 4: Results of the descriptive statistics analysis of the teacher's job involvement measuring indicators

Measuring indicators	N	Mean	%	Std. Deviation	Variance
ke full responsibility when teaching my lessons. o not be late, enter and leave class in the middle of class, ch students, talk on the phone, etc.)	406	4.54	90.8	.697	.486
Works with all his/her resources.	406	4.49	89.8	.662	.438
Work with enthusiasm and initiative/ proactive.	406	4.20	84.0	.751	.564
3. Has the right to independence in performing his/her duties.	406	4.06	81.2	.870	.757
4. Hard work contributes to the MUST's success.	406	4.04	80.8	.845	.714
5. Actively involved in achieving the mission of MUST.	406	3.93	78.6	.823	.677
6. My supervisor often asks for my opinion when making decisions.	406	3.12	62.4	1.136	1.290
7. Given professional development and training that allows participate fully.	406	3.11	62.2	1.191	1.417
8. Involved in the planning and implementation process when addressing changes within the organization.	406	2.99	59.8	1.070	1.146
Teacher's Job Involvement (JI)	406	3.83	76.6	.890	.832

Source: Developed by the researcher

According to the results of the descriptive statistics analysis of the teacher's job involvement measuring indicators are presented in Table 4, show that "Take full responsibility

when teaching my lessons." is 90.8%, "Works with all his/her resources" is 89.8%, and "Work with enthusiasm and initiative/ proactive" is 84.0% were above average and the most highly rated indicators. However, "Involved in the planning and implementation process when addressing changes within the organization" is 59.8%, "Given professional development and training that allows participate fully" is 62.2%, and "My supervisor often asks for my opinion when making decisions" is 61.0% were below average and the most inadequately rated indicators. The average job involvement rate is 76.6 percent.

The results of the descriptive statistics analysis of the teacher's job satisfaction measuring indicators are presented in Table 5.

Table 5: Results of the descriptive statistics analysis of the teacher's job satisfaction measuring indicators

Measuring indicators	N	Mean	%	Std. Deviation	Variance
nsider teaching to be a job that I am very proud of.	406	4.29	85.8	.818	.669
2. Feel a sense of pride to tell others I work at MUST.	406	4.13	82.6	.975	.951
Like to reveal to society that I am a teacher.	406	4.08	81.6	1.067	1.139
4. Feel comfortable working with my colleagues.	406	3.91	78.2	1.029	1.059
5. Respect my immediate supervisor.	406	3.86	77.2	1.052	1.107
Focus more on my teaching work than on my family problems.	406	3.59	71.8	.914	.836
6. Like our work environment.	406	3.33	66.6	1.048	1.099
Teacher's ergonomics of the workplace is suitable.	406	3.09	61.8	1.071	1.148
ghly satisfied by the monetary salary.	406	2.99	59.8	1.233	1.521
Teacher's Job Satisfaction (JS)	406	3.69	73.8	1.023	1.058

Source: Developed by the researcher

According to the results of the descriptive statistics analysis of the teacher's job satisfaction measuring indicators are presented in Table 5, show that "Consider teaching to be a job that I am very proud of" is 85.8%, "Feel a sense of pride to tell others I work at MUST" is 82.6%, and "Like to reveal to society that I am a teacher" is 81.6% are above average and are the most highly rated indicators. However, "Highly satisfied by the monetary salary" is 59.8%, "Teacher's ergonomics of the workplace is suitable"is 61.8%, and "Like our work environment" is 66.6% are below average and are the most poorly rated indicators. The average job satisfaction rate is 73.8 percent.

The results of the descriptive statistics analysis of the teacher's organizational commitment measuring indicators are presented in Table 6.

Table 6: Results of the descriptive statistics analysis of the teacher's organizational commitment measuring indicators

Хэмжих үзүүлэлтүүд	N	Mean	%	Std. Deviation	Variance
Can be loyalty and persistent to current job.	406	4.29	85.8	.818	.669
Will continue to do this work in the future.	406	4.12	82.4	.989	.977
nk of my team as a family.	406	3.92	78.4	.978	.956
Can freely express my opinions in the organization.	406	3.78	75.6	.939	.881
Go to work every day with motivated.	406	3.73	74.6	.993	.986
Believe that if i work hard in my organization, I will succeed.	406	3.55	71.0	1.066	1.137
Can get promoted if I try hard.	406	3.55	71.0	1.125	1.266
2. Treating the organization's problems as if they were one's own problems	406	3.21	64.2	1.269	1.609
3. Ready to put myself out just to assist the institution.	406	2.95	59.0	1.130	1.276
Teacher's Organizational Commitment (OC)	406	3.68	73.6	1.034	1.084

Source: Developed by the researcher

According to the results of the descriptive statistics analysis of the teacher's organizational commitment measuring indicators are presented in Table 6, show that the following indicators were rated as above average and highly rated: "Can be loyalty and persistent to current job" is 85.8%, "Will continue to do this work in the future" is 82.4%, and "Think of my team as a family" is 78.4%. However, the indicators rated as below average and highly rated were "Ready to put myself out just to assist the institution." is 59.0%, "treating the organization's problems as if they were one's own problems" is 64.2%, "Can get promoted if I try hard" is 71.0%, and "if I work hard, I believe I will succeed in the organization" is 71.0%. The average organizational commitment rate is 76.6 percent.

Results

The results of the assessment of the teachers' job attitude show that job involvement is 76.6%, job satisfaction is 73.8%, and organizational commitment is 73.6%. Of the three criteria for determining job attitude, job involvement received the highest rating, while organizational commitment received the lowest rating.

Teachers' job involvement: They involve in their work with all their resources, initiative, and responsibility. However, the results showed that the organization does not listen to the opinions of professors and teachers when making decisions, does not fully include them in professional development opportunities and training, and does not ensure equal involvement in decision-making in the planning and implementation of change processes.

Teachers' job satisfaction: They are satisfied with their teaching job and working at the MUST. However, the survey showed that they are less satisfied with the work environment, ergonomics, and salary.

Teachers' organizational commitment: The survey shows that they are committed to continuing to work in their current job. However, they are rated below average in indicators such as opportunities for promotion, treating organizational problems as their own, and self-sacrifice for the organization.

Conclusion

Attitudes of teachers toward the profession it is often about the liking of the profession or the recognition that it is socially necessary and important. In addition, teachers' loyalty to the profession or their sense of belonging is related to their attitudes towards the profession (Ayık & Ataş-Akdemir, 2014) (Temizkan, 2008). Similarly, in the study of Yurtseven and Dulay (2022), commitment was shown as one of the personal factors affecting attitudes towards the teaching profession. Therefore, having a good attitude towards teaching might help one develop professionally and be more commitment. (Yurtseven & Dulay, 2022).

In the future, the management of MUST needs to develop a program to improve the teacher's job attitude to their work, as well as teacher's job satisfaction and organizational commitment.

Discussion

Organizations need to study employees' job attitudes to ensure that employee performance, productivity, job satisfaction, turnover, and absenteeism are at normal and appropriate levels.

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Studying the of Anxiety in the Workplace of Generation Y and Z through Brain Science Methods

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Abstract: In this research, the personality traits of individuals were studied at the intersection of human resource management, psychology, and neuroscience using experimental research methodologies. The study's foundation lies in exploring how personality traits relate to workplace interpersonal dynamics, integrating theoretical and methodological frameworks from these three fields. Recent studies in management have focused on interpersonal communication patterns. Therefore, this research aims to examine the personality traits that negatively impact organizational relationships by correlating them with the behavioral patterns of individuals across different age groups. In the management studies, the personality traits identified in the "Five Factor Model" that categorized into positive and negative groups based on their contextual influences. As for Neuroscience, it examines the triggers of positive and negative behaviors using the "Neuropsychological model of emotion (NME)". The distinct feature of our study lies in integrating models from these fields and applying neuropsychological techniques to explore workplace relationships. To induce anxiety artificially, we identified and selected specific negative behaviors such as workplace conflicts, misunderstandings, and disputes involving managers. These negative interactions were recorded and presented to participants during the experiment. The psychological anxiety levels of participants in response to the stimuli were observed through alpha and beta wave activity in the prefrontal regions of the brain's left and right hemispheres. The relationship between alpha and beta waves during anxiety was analyzed using Independent Component Analysis (ICA). Additionally, the descriptive analysis feature of "IBM SPSS" was employed to compare alpha and beta wave activity between the left and right hemispheres during anxiety-inducing scenarios, confirming the hypothesis presented. The reliability of the proposed model was evaluated, yielding a result of 82.6%.

Keyword: *Five- Factor Model – FFM, Neuropsychological Model of Emotion – NME, Independent Component Analysis – ICA*

Introduction

The relationship between individuals and groups reflects the status of relationships within an organization. Therefore, the way individuals within a group unite and cooperate directly influences the organization's objectives (Batkhurel.G), productivity, and cultural patterns. Positive organizational relationships create an environment in which people's attitudes and psychological states are also positive, leading to higher productivity, performance, and organizational health. This forms the foundation for smooth organizational operations and growth (Sugarsuren.G, 2021). However, conflict in group relationships or misunderstandings among employees working in different departments negatively impact organizational performance (Tseren.G, 2021). These relationship-related issues are linked to generational behavior differences. It is essential to study the communication styles and relationship patterns of groups that make up the workforce to implement effective human resource policies, so such studies play a vital role in the development of organizational behavior and culture.

As per Karl Mannheim's "Theory of generations", individual behaviors are influenced by their surrounding social, educational and technological experiences (Mannheim, 1952). However, the study of personality traits is systematized and explained by theories such as Louis Goldberg's "Personality Trait Theory", Raymond Cattell's "Five-Factor Model" and Carl Jung's "Theory of Personality" (Goldberg, 1981), (Raymond, 1946). In "Personality Trait Theory" models have identified personality traits in a systematic way that are essential for statistical analysis in psychology and management. However, these models have limitations when applied to neuropsychology due to the difference in methodologies. Psychological research uses surveys and testing methods, while neuropsychology relies on experimental measurements.

The "Five-Factor Model" is a suitable framework for studying the interaction patterns between individuals and groups. Therefore, using the "Five-Factor Model" the study identified and analyzed workplace interaction styles that induce emotional responses (McCrae, 1987). In essence, this model was utilized to categorize negative actions in workplace interactions involving colleagues, managers, and leadership which are considered to trigger anxiety in individuals. The study explains the brain's response to such anxiety using neuroscientific methods. In neuroscience, brain activity is often studied in connection with psychological states, depending on an individual's psychological condition, the brain generates waves of specific frequencies. Each type of brain wave reflects unique physical and psychological characteristics, and the variations in these waves are linked to emotions and behaviors. The location of brainwave activity is defined by the 10-20 system, initially modeled by Hans Berger (Berger, 1929). The 10-20 model enables the measurement of brainwave activity through electrodes placed at designated points across the brain. The method of analyzing recorded brainwave data differs from measurement methods, as they examine the interaction patterns of the right and left hemispheres of the brain. The connection between brain hemispheres and psychological states has been established through experimental studies by Burrhus F. Skinner, Patricia K. Casper, and Edward D. Hopkins. Marion Heller and Edward Nitschke further demonstrated that emotional responses differ between the left and right hemispheres of the brain (Heller, 1998). These researchers found that the brain's alpha and beta waves are inversely correlated with positive and negative emotional states, leading to the formulation of the "positive and negative emotion model" (Guozhen).

In this study, we applied Marion Heller and Edward Nitschke's theories to explain how negative workplace interactions identified using the "Five-Factor model" contribute to individual anxiety. Negative stimuli (such as negative workplace interactions) were used in this experimental study to observe their effects on behavior and psychology. When participants

view the stimulus video, according to Roger Sperry's theory, distinct waves are activated at specific locations in the cerebral cortex. These waves reflect how individuals perceive the content of the negative stimuli and experience anxiety (Yanqiang, 2022). Since anxiety indicated a negative psychological state, we referenced theories by Burrhus F.Skinner, Patricia K.Casper, Edward D.Hopkins, Marion Heller, and Edward Nischke to interpret the relationship between brainwave patterns and the right and left hemispheres of the brain activity during emotional distress (Heller, 1998). EEG (electroencephalogram) is an equipment that is used to measure brainwave activity, allowing us to study these relationships scientifically.

In line with the "Theory of generations", we compared levels of anxiety across age groups. Statistical analysis of workplace-induced anxiety patterns was conducted and compared to generational behavior patterns described in the "Theory of generations". The findings indicate that failing to incorporate generational behavior patterns into human resource policies can lead to workforce shortages (Corinne, 2013). Currently, human resource policies are dominated by leadership and management from Generation Y, while the workforce primarily consists of Generation Z employees. Organizational leaders and managers must adopt flexible strategies that consider generational psychological characteristics, workplace conflicts, employee satisfaction, and retention. The study is grounded in the premise that investigating the relationships between these factors along with generational psychological characteristics using neuroscience methods is essential.

The participants selected for the study were employees from a single organization, varying in age, experience, skills, and education. Personal information about the participants was recorded in compliance with relevant laws and regulations and securely stored in a closed database. Since the study involved neuropsychological data, ethical approval for the experiment was obtained from the Academic Council of the University of the Humanities.

1. Theoretical and experimental research methodology

2.1 Theory of generational sociology

The core concept of this theory is that each generation is defined by a group of individuals tied to a specific period. These individuals are influenced by the societal ideologies, changes, and innovations they experience in their environment. Factors such as family structure, behavior, culture, and ideology play a significant role in shaping how individuals perceive and respond to societal norms. By experiencing these shared characteristics, people of a particular era are exposed to similar ideas, beliefs, and education, making them identifiable as a single generation.

The "Theory of generations" explains the specific types and differences in individual personality traits. Meanwhile, Robert McCrae's empirical studies highlight how personality traits evolve during the developmental process, as described through the Five-Factor Model (McCrae .. , 1999). The theories of Karl Mannheim and Robert McCrae intersect in their emphasis on individual personality traits, as confirmed by the findings of this study. However, considering the "Theory of generations" and the "Five-Factor Model" as fully correlated may result in overly narrow interpretations during the research process. From this, it becomes possible to explain personality changes through generational segmentation. This explanation forms the basis for hypothesizing that the negative emotional patterns of Generation Y and Generation Z are distinct from each other.

2.2 Theory of the five-factor model

In 1980, the Five-Factor Model was introduced by Louis Goldberg and later developed further by Robert McCrae and Paul Costa. This theory is distinguished in the field of management for not only addressing personality traits but also incorporating psychological

patterns. However, the Five-Factor Model is widely utilized beyond management and is commonly applied in the field of psychology. The model is considered well-suited for explaining personality traits and psychological patterns through empirical research methods. Consequently, this study applied the Five-Factor Model's dimensions to examine and identify negative behaviors in the workplace. Negative behaviors are found to influence individual psychological states, serving as the foundation for the emergence of negative emotional patterns.

2.3 Theory of Positive and Negative Emotions

Changes in behavior and psychological patterns are directly linked to brain wave activity, as highlighted in neuroscience. Therefore, explaining the neurophysiological reactions occurring in the brain during emotional states is crucial. The physiological responses associated with emotions in the brain were first explained through the "James-Lange Theory", proposed by William James and Carl Lange in the 1880s (Cannon, 1987). These physiological reactions are often interpreted based on the frequency of brain electrical waves.

Researchers such as (Berger, 1929), (Aleksandra, 2021), (Yanqiang, 2022), and (Yossi, 2019) have studied the generation of electrical waves in the brain during emotional states. Their studies empirically demonstrated that five types of brain waves are generated on the cerebral cortex when an individual's psychological state changes. These waves—delta, theta, alpha, beta, and gamma—reflect different emotional patterns.

When negative emotions arise in the brain, there is a correlation between alpha and beta waves. Specifically, when a calm individual experiences anxiety, the activity of alpha waves decreases while beta wave activity increases. Researchers Marion Heller and Edward Nitschke examined these correlations and proposed the "Neuropsychological Model of Emotion", which explains the patterns of positive and negative emotions, including anxiety.

Their research found that the brain's electrical waves change significantly during the perception of anxiety, with the most pronounced activity occurring in the frontal lobes of the brain. This finding was confirmed through empirical studies.

4. The Model Proposed During the Research Process

The differences in specific behaviors across generations have been discussed in management studies. These intergenerational differences suggest the potential for the development of unique personality traits that define individuals. Studying and comparing generational traits can support human resource managers in fostering positive interpersonal dynamics within organizations. Nowadays, examining generational theories reveals how personality traits and attitudes toward society vary, as evidenced by employment patterns. Emotional responses to organizational culture, managerial tasks, and workplace relationships differ across generations. Thus, it is essential to compare generational differences and apply management science-based strategies in human resource practices.

Management and psychology must investigate generational behaviors and psychological patterns in detail, which forms the goal of this research. Achieving this goal requires identifying the intersections of theories from management, psychology, and neuroscience. For this purpose, a model was developed to explore these intersections.

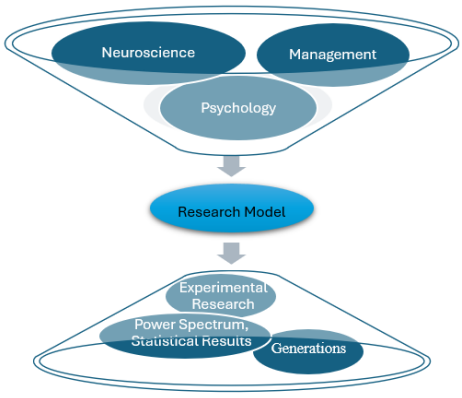

Fig. 1. Modeling of Interdisciplinary Research Work

The study of individual personality traits and patterns is a critical concern across these scientific fields. Moreover, recognizing generational personality traits is highly significant in today's human resources field. Therefore, this research was directed toward the human resource sector, focusing on how negative emotions might be triggered by workplace interactions and conflicts, based on experimental studies.

To explain interpersonal differences and behaviors theoretically, this study utilized the Theory of generations, which plays an essential role in categorizing generational differences in personality traits. Generational personality traits were linked to individual personality traits, making it necessary to explore the negative aspects of the Five-Factor Model's dimensions. Using experimental methods, this study examined how these negative traits influence individual psychological states.

The experimental model is illustrated in Fig. 2. Negative descriptions from the five dimensions of the Five-Factor Model were used to identify workplace conflicts and negative interactions, which served as stimuli for the participants. The negative emotional responses of participants were analyzed in detail using neuropsychological methods, identifying patterns of anxiety. When participants experienced a psychological shift after viewing the stimuli, specific brain waves were generated on the cerebral cortex at particular frequencies. These electrical waves allowed researchers to determine negative emotional patterns based on activity around the frontal regions of the right and left-brain hemispheres. Neuroscience defines emotional patterns through the Neuropsychological Model of Emotion, which explains psychological states during anxiety based on brain waves.

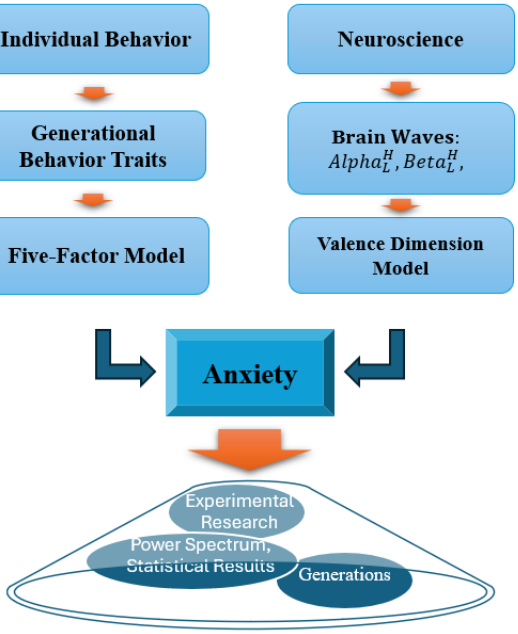

Fig.2. Experimental Model for Detecting Workplace Anxiety

The correlation between alpha and beta waves in the frontal regions of the right and left hemispheres explains states of psychological anxiety. When participants experienced anxiety from the stimuli, alpha wave activity decreased on the right side, while beta wave activity increased on the left. These wave changes are explained by linking them to shifts in wave amplitudes.

2. Experimental Results

When an individual psychologically perceives a given situation, neurophysiological waves are generated in the brain, which are linked to patterns of positive and negative emotions. To explore changes in psychological patterns, we selected negative actions from the dimensions outlined in the Five-Factor Model. Consequently, when participants viewed the stimuli, the interaction of neural cells in their brains resulted in the generation of alpha and beta waves in the frontal region. The correlation between alpha and beta waves is most prominently observed during states of anxiety. Negative emotional patterns, specifically anxiety, are most strongly generated in the frontal lobe region of the brain.

Electrodes were positioned on the frontal region of the brain based on this finding. This placement aligns with the increased wave activity in the frontal lobe during anxious states. The electrode placement was guided by Herbert Jasper's model. By completing these steps systematically, the conditions for conducting experimental measurements were established. Brain physiological data were transferred from TeleScan to MATLAB for processing (Al-Ezzi, 2019). The electrodes placed on the brain were classified by the right and left hemispheres. Electrodes on the left hemisphere were FP1 and F3; midline electrodes were FPz and Fz; and electrodes on the right hemisphere were FP2 and F4. Specifically, during brain responses, electrical impulses generated by neural interactions were discussed in the theoretical section.

When the brain responds, the interaction of numerous neurons generates electrical impulses that propagate as energy, creating potential differences around the cerebral cortex. These potential differences exhibit positive and negative values and are measured in microvolts. This principle is referred to as the Dipole Theory. Based on this theory, a mapping of how electrical waves propagate and evolve in the participant's brain while viewing the

stimulus was developed (Niedermeyer, 1996). Dipole positioning was determined according to Herbert Jasper's 10/20 EEG electrode placement system.

In the experiment, dipoles were used to model the recorded wave concentrations and brain mapping in two and three dimensions. Wave propagation values were visualized by categorizing voltage: red indicated positive voltage, while blue indicated negative voltage. This classification could be observed following the Independent Component Analysis (ICA).

3.1 Results of the Experimental Spectrum Analysis

To record brain wave activity, the frontal lobe of the brain was selected, and neurophysiological data were measured using the EEG international xx/xx electrode placement standard. Specific electrode placements chosen included FP1, FP2, FPz, F1, F2, Fz, and Oz. Additionally, GND and Ref electrodes were placed behind the ears. The activation of brain electrical waves was interpreted using the Neuropsychological Model of Emotion, which focuses on positive and negative emotions. This model was discussed in the theoretical section. The electrodes placed on the brain were categorized into right and left hemispheres. Electrodes for the left hemisphere included FP1 and F3, midline electrodes included FPz and Fz, and electrodes for the right hemisphere included FP2 and F4 (Al-Nafjan, 2017). During the video stimulus, the alpha and beta wave activations in the brain of one participant were processed using machine learning methods. The results are shown in the figure below.

Specifically, it was noted that the electrical impulses generated during brain responses differ based on neural interactions. The impulses exhibit polarity, being either positive or negative. Electrical impulses around the brain's dipole region (Pereda, 2005) were classified based on voltage: red indicates positive voltage, while blue indicates negative voltage. These classifications were visualized using the results of the Independent Component Analysis (ICA) processing. (see Fig. 3.)

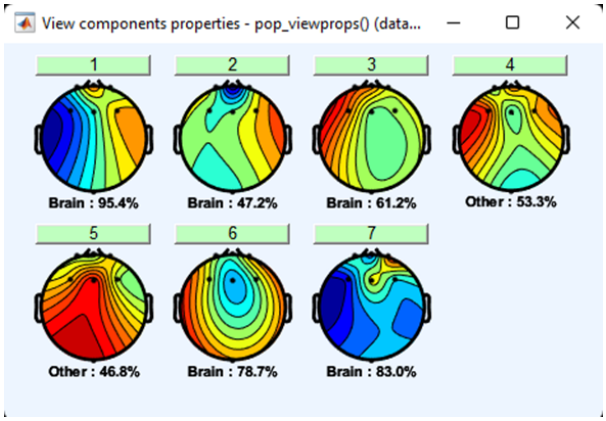

Fig.3. Topographic Values of Brain Waves on Seven Electrodes Obtained from the 168-Step Training Outcome

3.2 Application of Machine Learning in Brain Wave Processing and Its Results

While applying the PCA (Principal Component Analysis) algorithm was considered optimal, it was not used in data processing. This decision was based on the nature of brain waves, which are a composite of various waveforms or bundled data. In other words, brain waves are intertwined with signals such as muscle movement, eye movement, heartbeat, and brain activity. Using PCA risks eliminating certain critical types of waves, making them unsuitable for the experiment. To separate the recorded brain waves from the EEG device into distinct components, we employed the Independent Component Analysis (ICA) method. For data processing in the experiment, the machine learning steps were set to a maximum of 512

steps, while the learning rate was established between 0.xxx < S-rate > 0.xxx. A slow learning rate increases the time required for data processing, which is critical given the vast amount of data collected for brain waves—recorded every millisecond. Thus, selecting the correct learning rate is essential for efficient processing. Brain waves are unified bundles of various waveforms. Therefore, it is crucial to classify and process the distinct components for meaningful analysis. Biological variables such as wave power and wavelength were input into the machine learning process to calculate statistical measures like variance, kurtosis, and skewness. These statistical values were then used to compare and analyze brain wave distribution and emotional states, providing insights into the relationship between brain activity and emotions.

The study examined how participants experienced anxiety during stimulus video by correlating changes in energy generated by neural activity. This process represented the propagation of brain waves during anxiety as energy shifts during neuronal charge transitions, visualized using the Dipole method (Al-Nafjan, 2017). See Figure 4. Regions with high-amplitude bipolar waves were visualized in deep red and blue while decreasing wave intensity transitioned through red, green, yellow, and blue hues. Participants were divided into two groups, with 18 participants in total. Group 1 participants were born between 1980 and 1995, while Group 2 participants were born between 1996 and 2003. Each participant viewed a video with an average duration of 3 minutes. The video content was based on workplace scenarios involving interactions among colleagues. Each specific scenario within the video was marked as an event, with starting and ending timestamps, making it easier to distinguish between events. A total of 16 events were analyzed in this experiment.

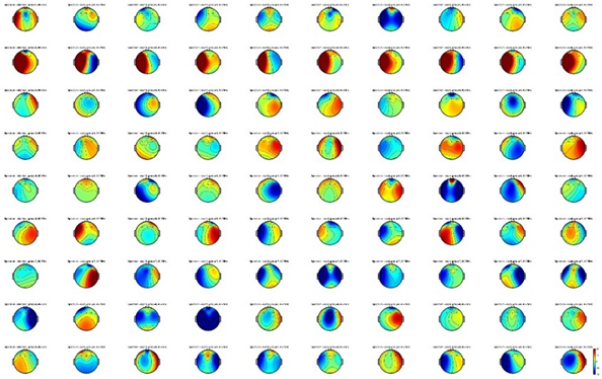

Fig. 4. Visualization of Brain Waves of Participants in Group 1 Using the ICA Dipole Method

In Fig. 4, events with relatively higher anxiety levels were selected based on spectral analysis results. It is important to note that participant responses to the video were inconsistent, likely due to generational differences in susceptibility to anxiety. According to the Theory of generations, the video content represented characteristics specific to each generational cohort [19].

Wave changes near the brain's dipole region were color-coded (Sperry, 1975), with red representing high-intensity waves and blue representing low-intensity waves. During the analysis, waves related to eye movements and muscle activity were excluded as much as possible. However, some residual waveforms could not be eliminated. For participants in Group 1, brain waves during anxiety were visualized using spectral analysis, as shown in Fig. 5. While all events in the video were viewed, participants from Generation Y showed relatively lower anxiety levels. This could be attributed to a characteristic feature of this generation. Slight anxiety was observed during scenarios depicting the risk of being fired or becoming unemployed (Kandel, 2000).

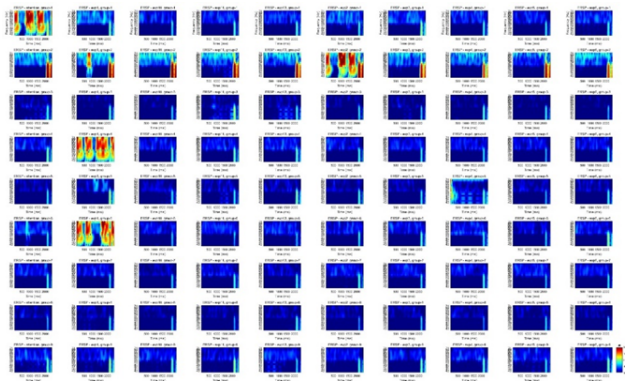

Fig. 5. Brain Mapping During Anxiety

When brain wave frequency ranges were refined to 8 Hz to 13 Hz, the results indicated a relatively calm state, suggesting participants were processing the situation without heightened anxiety. (see Fig. 6.)

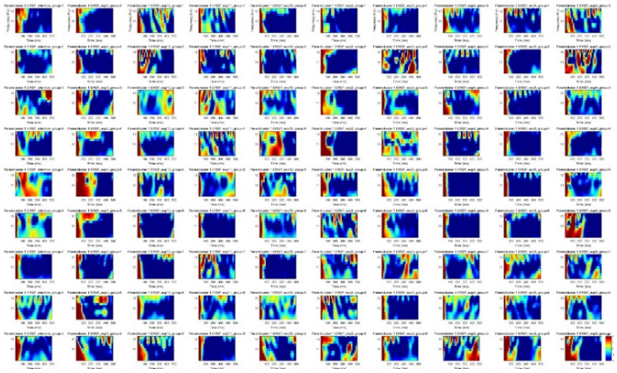

Fig. 6. When Adjusting the Brain Wave Filter Values to 8 Hz to 13 Hz

The results of Group 2 participants' brain waves are shown in Fig. 7. The experimental conditions for Group 2 were identical to those for Group 1. Compared to Group 1, participants in Group 2 demonstrated similar levels of perceived anxiety. Spectral analysis of ICA-calculated data is visualized in Fig. 8.

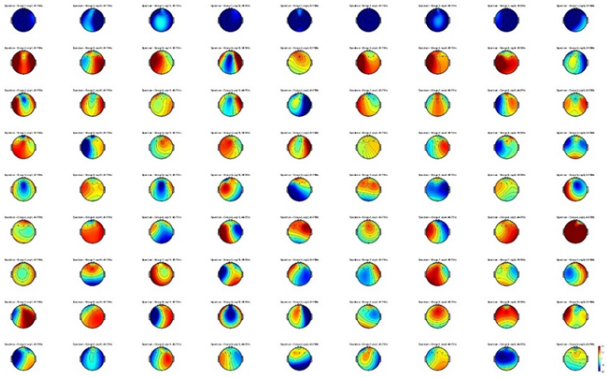

Fig. 7. Brain Mapping of Group 2 Calculated Using Dipole and ICA Methods

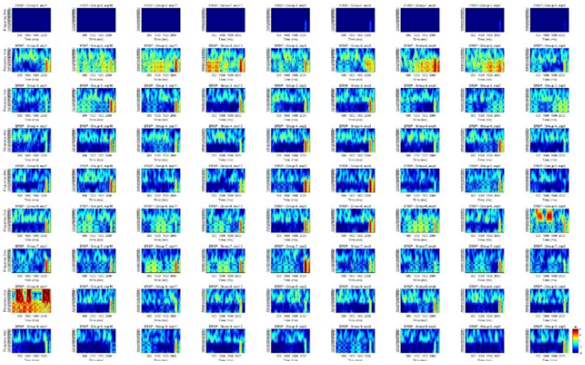

Fig. 8. Brain Mapping of Group 2 Participants Specifically Experiencing Anxiet

As seen in Fig. 8, Generation Z participants (Group 2) showed more active anxiety responses compared to Generation Y participants. The conditions triggering anxiety were tied to Event 2, which depicted a scenario where a manager entered the workplace, scolded an employee for failing to complete a task, and ignored the employee's explanations. In subsequent events, both groups exhibited relatively consistent responses, as confirmed by group-level experiments. The Topplot visualizations compared participants' anxiety levels during specific events.

3.3 Results of Statistical Analysis

To evaluate the reliability of the experimental measurements, Cronbach's alpha was calculated for 14 dependent variables (DV). According to international standards, a Cronbach's alpha greater than 0.70 is considered sufficient, and a value higher than 0.80 indicates high reliability. In this study, Cronbach's alpha was greater than 0.80 ($\alpha = 0.83$), demonstrating that the measurements were highly reliable. Additionally, the alpha value did not change significantly when any variable was removed from the analysis, indicating that these 14 variables are consistent and do not distort the results. (see Table 1).

A descriptive statistical analysis of the results showed that the control and experimental groups included 66 participants, with a mean age of 26.48 (SD = 6.15), ranging from 20 to 44 years. Of the 80 participants, 14 individuals who did not experience anxiety during the experiment were excluded from the analysis. The levels of anxiety in these participants were assessed using the Hospital Anxiety and Depression Scale (HADS) based on self-reported questionnaires.

When divided by age groups, there were participants (54.5%) in the Generation XY group under the age of 28 and 30 participants (45.5%) in the Generation Y group over the age of 30. The results of the age-based analysis are presented in Table 1. Regarding gender, 48.5% of the participants were male (n = 32) and 51.5% were female (n = 34), indicating that gender balance was successfully maintained in the study. The sample included participants from seven different professions chosen randomly.

Table 1. Results of Reliability Analysis for the Experimental Model

Reliability	
Cronbach's Alpha	Variables
.826(82.6%)	14

The reliability analysis of this experiment was compared to the findings of international studies, as shown in the Fig.9. below.

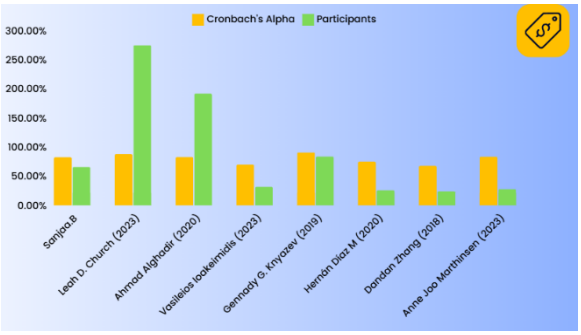

Fig. 9. reliability analysis reports

From the reliability analysis ratios presented in the table, it can be concluded that this experimental model represents an average level of reliability. However, differences in the study results may be attributed to variations in cultural, socio-economic, and educational factors specific to each country or population. This experiment incorporated characteristics unique to the Mongolian population.

3.4 Results of Correlation Analysis

Pearson's correlation statistical analysis revealed that the power of alpha and beta brain waves was significantly associated with participants' age. These correlations were moderate in strength and varied based on the measured locations of the brain waves. Specifically, alpha waves showed statistically significant negative correlations with age at the following frontal locations: FP1 ($R = -0.31^*$, $p < 0.05$), FPz ($R = -0.42^*$, $p < 0.001$), FP2 ($R = -0.33^*$, $p < 0.01$), and F4 ($R = -0.44^*$, $p < 0.001$). Similarly, beta waves demonstrated statistically significant negative correlations with age at the frontal locations FP1 ($R = -0.28^*$, $p < 0.05$), FPz $R = -0.37^*$, $p < 0.01$), FP2 ($R = -0.36^*$, $p < 0.01$), and F4 ($R = -0.41^*$, $p < 0.001$).

In contrast, no statistically significant correlations were observed for either wave type at F3, Fz, or Oz locations. This indicates that age-related correlations for alpha and beta waves were evident only in the anterior/inferior regions of the frontal brain on both the left and right sides (FP1, FPz, FP2) and in the posterior/superior region of the frontal brain on the right side (F4). However, no age-related changes were detected for alpha or beta waves in the posterior/superior region of the frontal brain on the left side (F3).

Furthermore, the amplitude strength of the waves was significantly correlated across the measurement locations. For both alpha and beta waves, statistically significant correlations were observed between the following locations: FP1 and FPz, FP1 and F4, FPz and FP2, FPz and F3, FPz and F4, F2 and F3, F2 and Fz, F2 and F4, F2 and Oz, F3 and Fz, F3 and F4, and Fz and F4. Interestingly, there was a high correlation between alpha and beta waves across all measured locations, suggesting that alpha and beta waves tend to co-activate strongly.

3.5 Effects of Anxiety, Age Group, and Gender

The T-test analysis demonstrates how alpha and beta brain waves activate based on anxiety levels, age cohorts, and gender. When comparing the control and experimental groups using a two-tailed T-test, statistically significant higher activation of alpha waves was observed in the experimental group experiencing anxiety at FPz, FP2, F3, and Fz locations, while beta waves showed significant activation only at F3.

Specifically, the power of alpha waves showed medium differences at the following locations:

FPz: $t(64) = -2.23$, $p < 0.05$, Cohen's $d = -0.55$

FP2: $t(64) = -2.82$, $p < 0.01$, Cohen's $d = -0.69$

F3: t(64) = -2.81, p < 0.01, Cohen's d = -0.69
Fz: t(64) = -2.31, p < 0.05, Cohen's d = -0.57

For beta waves, the power at F3 showed a strong difference:

F3: t(64) = -3.41, p < 0.001, Cohen's d = -0.84.

These findings suggest that when processing anxiety-related workplace information, the brain emits medium-intensity diffuse alpha waves and strongly localized beta waves on the left side. This supports the Neuropsychological Model of Emotion, demonstrating that alpha and beta waves play distinct roles in responding to anxiety. Alpha waves appear to reflect diffuse, widespread processing, while beta waves are more localized and intense.

3.6 Analysis of the Right and Left Hemispheres of the Brain

Alpha and beta waves originating from the anterior/inferior frontal regions are closely associated with the activity of the brain's prefrontal cortex, the center for higher cognitive functions. These waves are also significantly linked to how emotions, such as anxiety, are perceived and processed in the right or left hemispheres of the brain (Al-Ezzi, 2019). From the study, alpha waves generally appeared symmetrically across the right and left hemispheres under most stimuli. However, during strong anxiety-inducing stimuli, alpha waves were more dominant in the right hemisphere. In contrast, beta waves predominantly appeared in the left hemisphere under most stimuli but shifted dominance to the right hemisphere during highly anxiety-inducing situations. Notably, the power of beta waves was generally higher than alpha waves across most locations (see Appendix №1).

3.7 Generation Sensitivity to Anxiety

When comparing Generation Y (28 years and older) and Generation Z (27 years and younger) participants, alpha waves for Generation Z were significantly stronger than those of Generation Y at the FP1, FPz, FP2, Fz, and F4 locations. However, there were no significant differences at the F3 and Oz locations, where the wave activity was similar. For beta waves, Generation Z also demonstrated significantly stronger wave activity than Generation Y at FP1, FPz, FP2, and F4. However, no significant differences were observed at Fz, F3, and Oz locations.

These findings suggest that both alpha and beta waves tend to exhibit stronger activity across most brain regions in younger Generation Z participants compared to the older Generation Y participants. This implies that younger individuals from Generation Z expend significantly more energy in the brain's prefrontal cortex when processing workplace anxiety-related information.

Proposed model and recommendations

Within the scope of this study, the proposed research model identifies how generational psychology evolves in response to workplace actions and conflicts using neuropsychological methods. Thus, we developed a model that enables the study of workplace conflicts and negative behaviors in relation to generational personality traits.

The findings indicate that studying generational traits and emotional patterns through neuropsychological methods is effective. Compared to traditional survey and test-based approaches, using brain measurement techniques proves to be more impactful in understanding such dynamics. Additionally, the results demonstrate the feasibility of applying neuropsychological methods to study individual personality traits in the field of human resource management. As a multidisciplinary foundational study spanning management,

psychology, and neuroscience, this research can be a valuable resource for scholars in these fields. Moreover, since the study works with real emotional data, it provides a basis for further research on numerous related topics.

Conclusion

The primary objective of this study was to examine the patterns of anxiety individuals experience in workplace relationships. By analyzing anxiety patterns in relation to age, the findings suggest that these patterns can effectively represent generational personality traits. Consequently, a total of 66 participants, were included in the study to explore these anxiety patterns. To explain susceptibility to anxiety, the study explored a model that integrates management, psychology, and neuroscience to investigate individual personality traits.

This model is based on the Five-Factor Model, which explains external factors affecting employees' satisfaction, attitudes, and relationships in the workplace. The Five-Factor Model is commonly used in human resource management to assess psychological states, workplace compatibility, and personality traits of employees during recruitment. Furthermore, it is well-suited for studying personality traits through experimental methods. In psychology, the Big Five Model is widely used to define individual personality traits.

The comparison of measures between these two models indicated significant similarities, making them complementary for studying personality traits. The Five-Factor Model can be further refined by linking it with psychological patterns, and in neuroscience, it can be connected to the Neuropsychological Model of Emotion (Positive and Negative Emotion Model). Changes in individual personality traits are directly linked to the activity of neurotransmitters. As a result, specific frequencies of brainwaves are generated during changes in emotions and behaviors. The Five-Factor Model helps identify the causal actions leading to emotional states, while the resulting emotional patterns can be explained using the Neuropsychological Model of Emotion. The study's general conclusions and findings contribute to the integration of these models for understanding personality traits, emotions, and their neuropsychological underpinnings.

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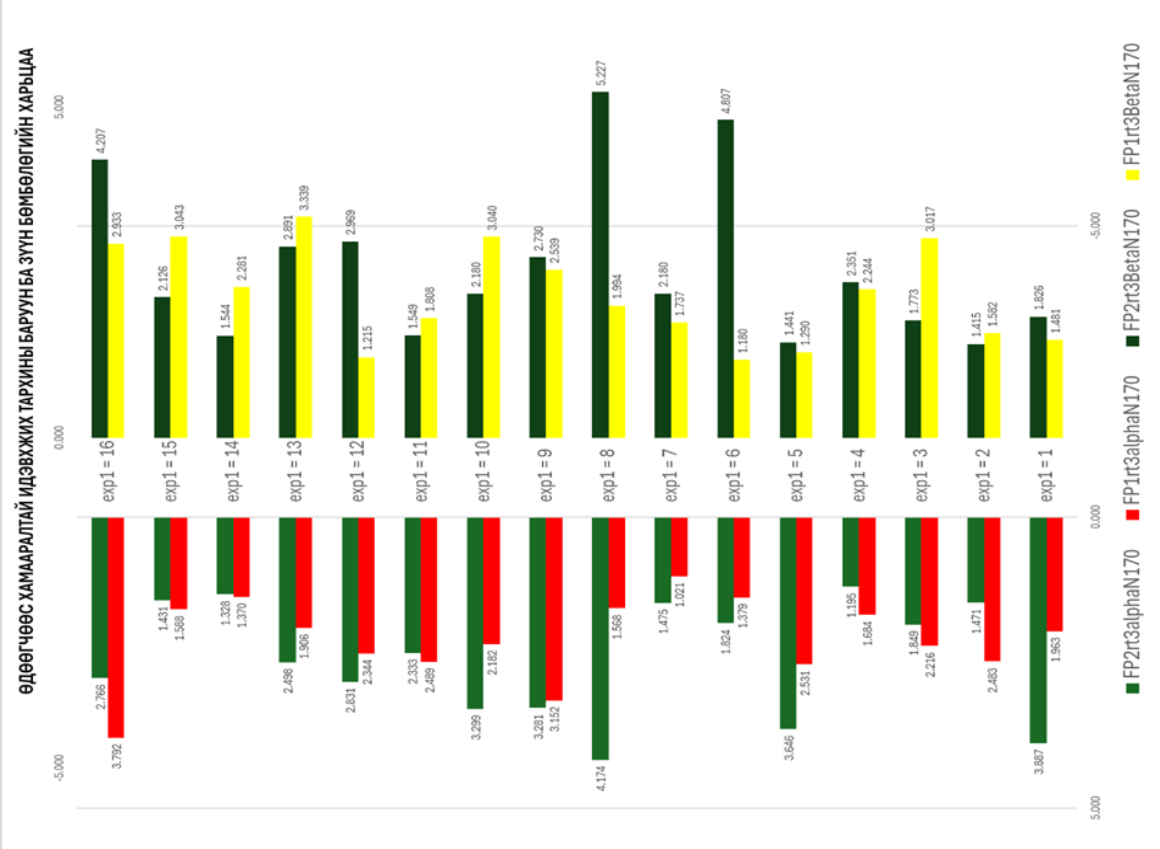
Appendix №1: Graph 3. Differences in Waves Between the Right and Left Hemispheres



The Effects of Bilingualism on Multicultural Attitude

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Abstract. The effects of bilingualism on cognitive functions has been well studied over the past decades. However, no studies have been carried out on the effect of bilingualism on personality and attitude in Mongolian-English bilinguals. The present study aims to examine the possible effects of bilingualism on attitudes towards cultural differences. A total of 274 participants (114 males, 160 females) took part in this study. Mean age was 16 years (*SD* = 3.7). The sample consists of 149 monolinguals and 125 bilinguals who reported learning English for approximately 6-9 years. The Multicultural Personality Questionnaire (MPQ), developed by Van der Zee and van Oudenhoven, was used to assess the participants' explicit attitudes toward cultural differences. Additionally, the Implicit Attitude Test, designed by the authors following a similar logic to the Implicit Association Test, was used to measure implicit attitudes. Pearson correlation, independent samples T-test and MANOVA were used for statistical analysis to evaluate differences between bilinguals and monolinguals as well as across different age groups. The result reveals that both the Multicultural Personality Questionnaire and Implicit Attitude Test scores were higher in bilinguals than in monolinguals. The findings suggest that bilingualism improves intercultural sensitivity and the skills needed to thrive in a multicultural setting.

Keywords: *Bilingualism, explicit attitude, implicit attitude, cultural differences*.

Introduction

Bilingualism is on the rise in many parts of the world and more than half of the world's population is bilingual (Bialystok et al., 2012). Although there is no precise definition of bilingualism, researchers widely accept that bilingualism is the ability to proficiently use two languages and bilinguals are those who use two languages in their everyday lives (Grosjean, 2019; Wei, 2000). Studies from the early to mid-20th century suggest that bilingualism negatively affects child's cognitive and verbal development. Bilingual individuals perform worse on certain verbal tests of cognitive abilities and speaking multiple languages could potentially interfere with cognitive processes, leading to lower scores on tests designed to measure verbal intelligence (Darcy, 1953). However, Peal & Lambert (1962) addressed that it's important to note that these early studies were limited in scope and methodology. They often didn't account for variables such as the proficiency in each language, the context in which the languages were used, or the individual differences among participants. More recent studies

have shown that bilingualism positively affects cognitive abilities even if it started late. For example, bilingual individuals often demonstrate enhanced executive functions (Bialystok & Martin, 2004), better cognitive flexibility (Adi-Japha et al., 2010), metalinguistic awareness (Cummins, 1978), phonetic perception (Antoniou et al., 2015) and creative thinking skill (Lee & Kim, 2011).

In recent years, there has been increasing scientific interest in investigating the relationship between bilingualism/multilingualism and attitude (Dewaele & Van Oudenhoven, 2009). More and more studies are conducted to find out whether multilingualism has a positive effect on cognitive flexibility, cultural empathy and open-mindedness. Previous studies demonstrate that bilinguals are more cognitively and socially flexible than monolinguals, meaning they can switch between different mental sets more easily. For example, according to Elif G. Ikizer and Nairán Ramírez-Esparza (2018), bilinguals are better than monolinguals at switching between and adapting to different social environments. Compared to monolinguals, bilinguals reported greater social flexibility. This is because bilinguals are aware of two or more cultural worlds.

Cultural empathy is regarded as a vital skill that allows individuals to approach cultural diversity with an open mindset. Cultural empathy is the ability to understand and connect—with thoughts, feelings, and actions—to individuals from dissimilar cultural groups. (Bayne et al., 2023). Bilingualism promotes a better comprehension of diverse viewpoints and cultures, which increases cultural empathy. Learning a new language often involves learning about the people who speak it, their traditions, and their views and, thus, promotes a less ethnocentric and more inclusive perspective. This in turn strengthens the social bonds of people with various cultural backgrounds. Dewaele and Wei (2012) found that people who speak two and more languages were better able to see the world from their interlocutor's point of view. Later Dewaele and Stavans (2014) stated that advanced knowledge of more languages was also linked to higher levels of cultural empathy. Being multilingual enables people to consider things from several cultural angles, which makes it easier for them to understand the feelings and experiences of others.

Knowing more languages and especially using them frequently is linked to a higher level of open-mindedness (Dewaele & Van Oudenhoven, 2009). The authors looked into the relationship between five personality dimensions and the number of languages the participants speak**.** The study revealed that the multilingual group scored significantly higher on open-mindedness than the group of beginning bilinguals. Korzilius, Van Hooft, Planken and Hendrix (2011) also found a favorable correlation between a person's degree of open-mindedness and the number of languages they speak. According to their research, multilingual people are generally more accepting of other people's opinions. This might be the case because acquiring new languages exposes people to a wide range of cultures, opinions, and ways of thinking which inspires them to accept different viewpoints.

Bilingualism enhances not only cognitive abilities but also emotional and social skills, fostering greater flexibility, cognitive and cultural empathy, and openness to new experiences. While extensive research has examined the effects of bilingualism on cognitive functions, its impact on personality and attitude remains largely unexplored, particularly in Mongolian-English bilinguals. This gap highlights the need for further investigation into how bilingualism influences personal traits beyond cognitive development.

Research goal and hypothesis

The present study aims to examine whether bilingualism affects attitude towards cultural differences. It has been hypothesized that bilingualism will improve explicit and implicit multicultural attitude.

Methodology

Participants

A total of 274 participants (114 males, 160 females) aged 10-25 (M = 16, SD = 3.7) took part in the study voluntarily. The sample consisted of 149 monolinguals and 125 bilinguals. The sample size was calculated according to Tabachnick and Fidell formula (Tabachnick & Fidell, 2013). The participants were from families with similar socio-economic backgrounds and the experience of learning a foreign language. The participants were divided into five age (10-11, 12-14, 15-17, 18-20, 21-25) and two language (monolingual, bilingual) groups.

Measurements

The questionnaire consisted of the following questions: participants' age, gender, place of residence, household income, foreign language level, and the period of regular use of the foreign language (number of hours a day, days per week and years).

The Multicultural Personality Questionnaire (MPQ) developed by Van der Zee and van Oudenhoven (2000) was used to understand the participants' explicit attitude towards cultural differences. The 40-item MPQ measures five traits with 8 items in each that are of relevance to intercultural success: cultural empathy, flexibility, open-mindedness, social initiative and emotional stability. Participants responded to personal descriptors attached to the sentence stem: "To what extent do you agree with the following statement?" Each item was scored on a 5-point Likert-type scale ranging from 1 (totally not applicable) to 5 (completely applicable). The mean score for each trait is calculated by averaging the answers to the items. High scores indicate strong competence in multicultural settings and vice versa.

Implicit Attitude Test (IAT). Following a similar logic to the Implicit Association Test (IAT; Greenwald et al., 1998), the authors developed a 32-item Implicit Attitude Test to measure the participants' implicit attitude towards cultural differences. It comprised of 4 scales with 8 items each: other's custom, value & belief, art and language. Three trials were performed for each item resulting in a total of 96 trials. The participants were instructed to read a short sentence that appeared on screen and choose either "pleasant" or "unpleasant" as quickly as possible. The reaction time and responses were recorded on software for further analysis. The frequency of "pleasant" and "unpleasant" responses were evaluated for further analysis. Table 1 shows the reliability analysis of both the Multicultural Personality Questionnaire and the Implicit Attitude Test.

Table 1. Reliability analysis

Measures	Reliability Method	Reliability Coefficient	Interpretation
Multicultural Personality Questionnaire	Cronbach's Alpha (Internal Reliability)	α = .88	Reliable

Implicit Attitude Test	Cronbach's Alpha (Internal Reliability)	α = .75	Reliable

Data analysis

The data was collected via Google form and Kahoot platform, and SPSS (Version 26.0) was used to conduct the statistical analyses. Pearsons correlations were used to analyze the relationships between the variables, independent samples T-test was used to compare monolingual and bilingual groups and multivariate analysis of variance (MANOVA) - for comparing language and age group differences.

Results

Bilinguals scored higher in explicit attitude measurements (MPQ). The results showed a small but significant difference between monolinguals and bilinguals in flexibility and open-mindedness but there were no significant differences in cultural empathy, social initiative and emotional stability. Table 2 details the scoring for each MPQ scale.

Table 2. *Differences on the Multicultural Personality Questionnaire scales between the monolingual and bilingual groups*

Variables	**Group**	***M***	M_{diff}	***SD***	***t*(df)**	***p*-value**
Flexibility	Monolingual	3.50	-.22	.633	-2.890(272)	.004**
	Bilingual	3.72		.643		
Open-mindedness	Monolingual	3.53	-.17	.653	-2.222(272)	.027*
	Bilingual	3.70		.635		
Cultural Empathy	Monolingual	3.81	-.09	.633	-1.301(272)	.194
	Bilingual	3.90		.615		
Social Initiative	Monolingual	3.05	-.12	.524	-1.838(272)	.067
	Bilingual	3.17		.564		
Emotional Stability	Monolingual	3.29	-.02	.573	-.316(272)	.752
	Bilingual	3.31		.653		

*p < 0.05, **p < 0.005

Table 3 presents 2 x 5 (age x language)factorial comparisons using MANOVA and showed significant differences between language groups across different ages. In particular, small but significant differences between bilinguals and monolinguals were found in flexibility (age groups of 18-20 and 21-25) and open-mindedness (age group of 21-25). There was no significant difference between the two language groups in cultural empathy, social initiative and emotional stability. The result also indicated that older bilinguals (age 18-25) reported that they are more flexible and open-minded towards cultural differences than monolinguals. However, there is no such difference between the two groups for under 18.

Table 3. Differences in the Multicultural Personality Questionnaire scales between the age and language groups tested with ANOVA

Age group	**Dependent variables**	**Monolinguals *M* (*SD*)**	**Bilinguals *M* (*SD*)**	M_{diff}	***F***	***p*-value**

10 - 11	Flexibility	3.42 (.69)	3.80 (.52)	.379	3.743	.061
	Open-mindedness	3.47 (.77)	3.65 (.48)	.176	.733	.397
	Cultural Empathy	3.53 (.69)	3.65 (.48)	.124	.415	.523
	Social Initiative	3.05 (.52)	3.30 (.65)	.247	1.678	.203
	Emotional Stability	3.00 (.47)	3.10 (.64)	.100	.306	.584
12 - 14	Flexibility	3.50 (.68)	3.57 (.78)	.065	.115	.735
	Open-mindedness	3.53 (.68)	3.65 (.77)	.126	.436	.511
	Cultural Empathy	3.79 (.66)	3.87 (.54)	.080	.237	.629
	Social Initiative	2.95 (.65)	3.04 (.47)	.096	.374	.543
	Emotional Stability	3.21 (.57)	3.35 (.64)	.137	.740	.393
15 -17	Flexibility	3.68 (.58)	3.70 (.70)	.019	.012	.912
	Open-mindedness	3.71 (.57)	3.74 (.68)	.033	.039	.845
	Cultural Empathy	3.82 (.57)	3.83 (.65)	.003	.000	.988
	Social Initiative	3.24 (.49)	3.22 (.60)	.018	.015	.903
	Emotional Stability	3.26 (.56)	3.13 (.54)	.134	.790	.378
18 - 20	Flexibility	3.45 (.60)	3.77 (.64)	.324	4.928	.030*
	Open-mindedness	3.47 (.64)	3.71 (.66)	.241	2.446	.122
	Cultural Empathy	3.87 (.57)	4.03 (.66)	.160	1.215	.274
	Social Initiative	3.00 (.32)	3.09 (.61)	.086	.568	.454
	Emotional Stability	3.47 (.60)	3.57 (.65)	.098	.441	.509
21 - 25	Flexibility	3.35 (.58)	3.75 (.53)	.400	5.618	.022*
	Open-mindedness	3.40 (.59)	3.75 (.53)	.350	4.220	.046*
	Cultural Empathy	3.95 (.68)	4.04 (.62)	.092	.215	.645
	Social Initiative	3.00 (.56)	3.25 (.44)	.250	2.727	.106
	Emotional Stability	3.40 (.50)	3.25 (.67)	.150	.674	.416

*p < 0.05, **p < 0.005

We checked whether there were confounding variables such as household income affected the result. As shown in table 4, household income was not linked to the explicit attitude scores.

Table 4. Correlation between Household income and Multicultural Personality Questionnaire

		Cultural Empathy	Flexibility	Social Initiative	Emotional Stability	Open-mindedness
Household income	Pearson Correlation	.176	.140	-.104	-.093	.111
	Sig. (2-tailed)	.050	.119	.247	.301	.216

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Implicit attitude was higher in bilinguals than in monolinguals according to the IAT results. The result showed a statistically significant difference between bilinguals and monolinguals in all scales. Table 5 shows the scoring for each IAT scale.

Table 5. Differences in the Implicit Attitude Test scales between monolingual and bilingual groups

Variables	Group	M	M_{diff}	SD	t(df)	p-value
Art	Monolingual	4.46	-1.24	2.27	-4.913(272)	.001**
	Bilingual	5.71		1.85		
Value & Belief	Monolingual	5.17	-.83	1.66	-4.389(272)	.001**
	Bilingual	6.00		1.43		
Custom	Monolingual	2.60	-.75	1.69	-3.457(272)	.001**
	Bilingual	3.35		1.89		
Language	Monolingual	2.98	-1.24	2.41	-4.109(272)	.001**
	Bilingual	4.22		2.58		

*p < 0.05, **p < 0.005

The results showed that the response time was negatively correlated with all the scales of the Implicit Attitude Test; *Art* (R = -.26**, p < .001), *Value & belief* (R = -.18**, p = .003), *Custom* (R = -.19**, p = .002) and *Language* (R = -.22**, p < .001).

The frequency of regular use of English (number of days per week) has a statistically significant positive correlation with "pleasant" responses to *art* (R = .18*, p = .046) and *customs* (R = .22*, p = .012). This may suggest that the use of foreign language is linked to better cultural empathy and positive attitude towards other cultures.

We made sure whether the confounding factor of household income affected the Implicit Attitude Test result. As table 6 shows, there was no positive correlation between household income and the Implicit Attitude Test, suggesting that household income did not confound the bilingual group test result.

Table 6. Correlation between Household income and Implicit Attitude Test

		Art	Value & Belief	Custom	Language
Household income	Pearson Correlation	.095	.150	.061	.009
	Sig. (2-tailed)	.293	.095	.496	.920

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

For further analysis, age and language groups were compared by using MANOVA and 2 x 5 (age x language) factorial analyses results showed significant differences in all scales

across all age groups except for an age group of 21-25. The highest difference is in the age group of 10-11, followed by 18-20. However, there is no such difference between the two groups for the age of 21-25. Table 7 details the MANOVA results.

Table 7. Differences in the Implicit Attitude Test scales between the age and language groups tested with ANOVA

Age group	**Dependent variables (Pleasant)**	**Monolinguals *M* (*SD*)**	**Bilinguals *M* (*SD*)**	M_{diff}	***F***	***p*-value**
10 - 11	Art	3.63 (2.4)	6.50 (1.5)	2.86	19.589	.001**
	Value & Belief	4.26 (1.7)	6.40 (1.7)	2.13	14.379	.001**
	Custom	2.89 (1.7)	4.83 (1.8)	1.93	11.062	.002**
	Language	2.74 (2.4)	5.75 (1.8)	3.01	19.549	.001**
12 - 14	Art	4.87 (2.0)	5.74 (2.0)	.871	2.535	.117
	Value & Belief	5.47 (1.5)	5.61 (1.0)	.135	.144	.706
	Custom	2.66 (1.5)	3.91 (1.9)	1.25	7.637	.008*
	Language	3.45 (2.7)	3.96 (2.7)	.509	.480	.491
15 -17	Art	4.00 (2.5)	5.39 (1.8)	1.39	5.081	.028*
	Value & Belief	4.94 (1.8)	6.13 (1.4)	1.18	6.650	.013*
	Custom	2.76 (1.5)	3.13 (1.6)	.366	.728	.397
	Language	2.44 (1.8)	3.26 (2.4)	.820	2.054	.572
18 - 20	Art	4.89 (2.0)	5.80 (1.7)	.905	4.059	.048*
	Value & Belief	5.34 (1.6)	6.06 (1.3)	.715	4.072	.047*
	Custom	2.24 (1.8)	2.57 (1.7)	.335	.637	.428
	Language	2.84 (2.2)	4.63 (2.6)	1.78	9.895	.002**
21 - 25	Art	4.45 (2.1)	5.21 (2.1)	.758	1.410	.242
	Value & Belief	5.50 (1.2)	5.83 (1.6)	.333	.576	.452
	Custom	2.60 (1.9)	2.92 (1.5)	.317	.369	.547
	Language	3.50 (2.8)	3.54 (2.6)	.042	.003	.959

*p < 0.05, **p < 0.005

Discussion

This study investigated the effects of bilingualism on attitude towards cultural differences. The hypothesis was confirmed and bilinguals had higher scores in both explicit and implicit attitude tests, than in monolinguals. On both MPQ and IAT tests, the bilinguals outperformed their monolingual counterparts. This may be because by learning a foreign language, learners are exposed not only to a different language system but also to cultures, customs, and beliefs that differ from their own. This is in line with existing literature that being

familiar with two or more cultures allows individuals to perceive the world through at least two distinct conceptual frameworks. These enhanced conceptual representations may improve cognitive flexibility (Bialystok, 2001). In our participants, their previously existed attitudes may have been challenged when new linguistic information was introduced, and were reinforced to change to see the world from various perspectives. In the explicit attitude test, older bilingual participants considered themselves more flexible and open-minded regarding cultural differences compared to their monolingual peers. However, younger bilingual participants showed more positive implicit attitudes towards other cultures. This implies that bilinguals develop positive attitudes at young ages, but become explicitly aware of them after the age of 18. The regular use of English has a positive correlation with the attitude towards arts and customs, which suggests that the more a foreign language is used regularly, the more positive attitude to other cultures and traditions develops. These results support the previous literature that bilingual individuals often exhibit better perspective-taking abilities, which fosters greater cultural understanding and appreciation (Bialystok, 2001).

According to Dewaele, J.M and Van Oudenhoven, J. P (2009), children who learned a foreign language and grew up in a different culture and society were more open-minded than the monolinguals and easily understood and showed respect to other cultures. By learning foreign languages, people evaluate other cultures from not only the perspective of his own culture but also appreciates the diversity of cultures and develops intercultural competence. A similar pattern emerged in Curtain and Dahlberg (2010), where bilinguals tend to have a greater sense of multiculturalism and easily communicate with people from different cultural backgrounds. Our study corresponds to the above study and shows that by learning foreign languages and cultures, individuals become more open-minded and flexible to the differences in culture, traditions, beliefs and languages.

Conclusion

Our overall findings suggest that bilingualism helps develop intercultural sensitivity and the skills needed to thrive in a multicultural setting. Raising multilingual citizens could be an effective way to improve intercultural competence and create a more cohesive society.

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Mothers at the Margins: Reimagining Identity and Driving Societal Innovation through Diasporic Narratives

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Abstract. Motherhood, often confined to the margins of societal narratives, emerges as a silent force that redefines identity, challenges cultural constraints, and drives transformative change. Maternal marginality, often relegated to the peripheries of societal consciousness, occupies a transformative space in the works of Chitra Banerjee Divakaruni and Amy Tan. Their narratives depict mothers who navigate the intricate intersections of gender, culture, and diaspora, where the burden of preserving tradition collides with the desire for self-assertion. These maternal figures, caught between inherited expectations and the pressures of a changing world, embody silent resistance and quiet resilience. Through their struggles, Divakaruni and Tan illuminate the complexities of female identity in diasporic contexts, where motherhood becomes both a site of subjugation and a platform for subtle defiance. This research adopts an interdisciplinary approach by integrating feminist theory, postcolonial criticism, migration studies, and trauma theory to analyze how these narratives dismantle dominant cultural paradigms. The study explores how maternal figures, while marginalized within their communities, reclaim agency through adaptive strategies that challenge systemic inequities. By amplifying these often-overlooked voices, the narratives create a discourse that transcends boundaries and interrogates patriarchal norms, offering alternative pathways toward empowerment and inclusion. These narratives do not merely document marginality but actively reshape societal perceptions, aligning with the United Nations' Sustainable Development Goals (SDGs), particularly Goal 5: Gender Equality and Goal 10: Reduced Inequalities. Through this exploration, research underscores the potential of literature to serve as a catalyst for societal transformation by advocating for sustainable and equitable progress.

Keywords: *Maternal Marginality, Female Identity, Diasporic Narratives, Cultural Innovation, Gender Subjugation, Interdisciplinary Framework, Sustainable Development Goals, Societal Transformation*

Introduction

Motherhood, often relegated to the peripheries of societal discourse, emerges as a silent yet transformative force in diasporic narratives—one that negotiates cultural tensions, sustains intergenerational identities, and quietly resists systemic constraints. Within the shifting landscapes of migration and displacement, maternal figures navigate a precarious terrain where ancestral traditions clash with the exigencies of modernity, leaving them suspended between duty and desire, sacrifice and autonomy. Yet, these mothers remain invisible within dominant literary discourses —their struggles silenced, their agency unacknowledged, and their emotional labor taken for granted. In diasporic literature, maternal narratives exist in a liminal space where they shape the trajectories of daughters while bearing the burdens of cultural continuity and emotional resilience.

The works of Chitra Banerjee Divakaruni—Before We Visit the Goddess, Sister of My Heart, and Queen of Dreams—and Amy Tan—The Joy Luck Club, The Bonesetter's Daughter, and The Kitchen God's Wife—illuminate these complex negotiations, where mothers oscillate between preserving cultural heritage and forging spaces for self-assertion. In Sister of My Heart, Sudha and Anju's mothers embody the quiet resilience of women who uphold familial honor while silently enduring personal sacrifices. Before We Visit the Goddess traces the intergenerational legacies of Sabitri, Bela, and Tara, where maternal sacrifices are etched into the fabric of their diasporic experiences. Queen of Dreams explores the enigmatic silence of Rakhi's mother, whose prophetic visions mask a history of unspoken trauma and fragmented identities.

Similarly, Tan's maternal figures wrestle with the emotional burden of cultural alienation. The Joy Luck Club captures the chasm between Chinese immigrant mothers and their American-born daughters, where unarticulated maternal sacrifices create emotional dissonance. In The Bonesetter's Daughter, Ruth inherits her mother LuLing's suppressed traumas, highlighting how maternal silence echoes across generations. The Kitchen God's Wife further unveils the emotional cost of maternal endurance, where silence becomes a defense mechanism to protect daughters from inherited pain.

These narratives are not merely reflections of maternal sacrifice—they are testimonies of survival, adaptation, and unacknowledged resilience that demand scholarly attention. Diasporic mothers, caught between the pressures of cultural preservation and the yearning for autonomy, occupy a marginal space where their agency is often overshadowed by the larger discourse on migration and assimilation. Why should these voices be reclaimed? Because their erasure perpetuates systemic silencing—reinforcing patriarchal paradigms that render maternal labor invisible and sustaining inequities that marginalize female autonomy. By foregrounding maternal figures in diasporic literature, this study aims to dismantle these silences and redefine female agency by examining how these mothers navigate and subtly resist socio-cultural constraints.

The primary aim of this study is to reclaim the marginalized narratives of diasporic mothers, exploring how their voices, often confined to the domestic sphere, resonate with quiet defiance and adaptive resilience.

Literature Review: Maternal Marginality as an Unexplored Space

The figure of the mother in diasporic literature has increasingly garnered scholarly attention as a nexus of cultural transmission, resistance, and redefinition. Scholars such as Marianne Hirsch (1997) have emphasized the role of maternal memory in shaping diasporic identity, particularly in contexts marked by trauma and dislocation. In *The Joy Luck Club*, Amy Tan presents intergenerational conflicts between immigrant mothers and American-born daughters as emblematic of a broader diasporic negotiation of identity (Tan, 1989; Wong, 1993). These maternal figures, while often silenced by language barriers and patriarchal traditions, emerge as agents of cultural preservation and quiet rebellion (Cheung, 1997).

Similarly, Chitra Banerjee Divakaruni's work explores maternal subjectivity in transnational settings, depicting mothers who resist cultural erasure through storytelling and nurturing resilience in their children (Divakaruni, 1997; Rayaprol, 1997). Her characters, situated at the intersection of gender and migration, complicate binary representations of tradition and modernity. Feminist scholars like Chandra Talpade Mohanty (2003) have critiqued Western

universalist approaches to female agency, advocating for a more nuanced understanding of women's roles within specific cultural and historical frameworks. This aligns with postcolonial theorists such as Gayatri Chakravorty Spivak (1988), who call for the recovery of subaltern voices—mothers included—within dominant discourses.

Contemporary studies have begun to position maternal narratives as transformative tools within both literature and society. Through the lens of trauma theory (Caruth, 1996) and migration studies (Brah, 1996), these works reveal how motherhood becomes a conduit for healing, identity negotiation, and subtle resistance. By foregrounding marginalized maternal experiences, diasporic literature not only interrogates cultural hegemonies but also contributes to global dialogues on gender equity and social inclusion (Katrak, 2006; Ahmed, 2017).

While the works of Divakaruni and Tan have received extensive scholarly attention, the critical focus has largely remained confined to feminist, diasporic, and postcolonial paradigms, overlooking the nuanced space of maternal marginality. Feminist critiques have analyzed these texts through the lens of gendered oppression and female autonomy, emphasizing the struggles of daughters to navigate patriarchal constraints. Diasporic studies have explored the tensions between cultural preservation and assimilation, highlighting the identity crises experienced by second-generation immigrants.

However, within these dominant frameworks, the experiences of mothers remain peripheral, their voices silenced by a discourse that privileges the struggles of daughters while ignoring the emotional labor and sacrifices that shape these trajectories. Maternal identities, deeply embedded in the reproduction of cultural norms and emotional labor, occupy a paradoxical space where they serve as both enforcers of tradition and silent challengers of patriarchal paradigms. The psychological and emotional burden borne by mothers in diasporic settings remains under-theorized and underrepresented, leaving a critical gap in understanding how maternal agency is negotiated in these liminal spaces.

Bridging the Gap

This study addresses this critical gap by shifting the focus from daughters' narratives of cultural negotiation to maternal experiences of silent resistance and intergenerational sacrifice. It seeks to redefine maternal agency by exploring how these narratives dismantle dominant cultural paradigms through subtle acts of defiance, resilience, and adaptive survival. By analyzing the complexities of maternal marginality, this study challenges the erasure of maternal voices and highlights how these narratives serve as catalysts for societal transformation.

Global Imperatives: Gender Equity and Social Inclusion

The urgency of this study is further underscored by its alignment with global imperatives such as the United Nations' Sustainable Development Goals (SDGs)- particularly Goal 5: Gender Equality and Goal 10: Reduced Inequalities. The marginalization of maternal voices perpetuates a dangerous silence that reinforces systemic gender inequalities and sustains emotional labor as an unacknowledged burden. By amplifying the voices of diasporic mothers, this study contributes to dismantling these inequities and fostering inclusive societal narratives that recognize and validate maternal experiences.

Societal Impact: Literature as a Catalyst for Change

Diasporic literature, by reclaiming the narratives of marginalized mothers, holds the potential to catalyze empathy, cultural understanding, and societal transformation. By interrogating the emotional cost of maternal labor and the psychological consequences of cultural displacement, these narratives offer a roadmap for fostering inclusivity and equity. Literature, in this context, becomes a medium of resistance—challenging patriarchal structures and reimagining alternative pathways toward empowerment and inclusion.

This study seeks to reclaim the marginalized narratives of diasporic mothers—not as silent victims, but as agents of subtle resistance and cultural innovation. By illuminating their struggles, sacrifices, and adaptive resilience, the research highlights the transformative potential of maternal narratives in reshaping societal perceptions and fostering equitable futures. Through this exploration, diasporic literature becomes a space where maternal voices, long confined to the margins, emerge as harbingers of societal change, challenging dominant paradigms and envisioning alternative futures where maternal agency is acknowledged, celebrated, and empowered.

Methodology

This study adopts a multifaceted interdisciplinary approach that integrates feminist psychoanalysis, postcolonial criticism, migration studies, and trauma theory to critically examine how maternal figures in the works of Chitra Banerjee Divakaruni and Amy Tan navigate marginality, subvert cultural paradigms, and reclaim agency within diasporic frameworks. The research is grounded in a dual-pronged methodology that combines close textual analysis of primary texts with empirical data collection through a meticulously designed questionnaire. This approach ensures a nuanced understanding of how maternal marginality is both represented in diasporic literature and experienced in real-world contexts.

Theoretical Framework and Textual Analysis

The textual analysis draws on an interdisciplinary theoretical framework to interrogate the nuances of maternal marginality and explore how maternal voices, often confined to the domestic sphere, negotiate agency through subtle acts of defiance and resilience.

- **Feminist Psychoanalysis**: Anchored in Nancy Chodorow's The Reproduction of Mothering, this study explores how maternal caregiving roles are culturally transmitted across generations, perpetuating emotional labor and reinforcing cycles of sacrifice and subjugation. Chodorow's framework provides critical insights into how daughters inherit maternal anxieties and emotional burdens, creating a legacy of maternal marginality that extends across generations.

- **Trauma Theory and Migration Studies:** The study also employs trauma theory to analyze the intergenerational transmission of trauma within diasporic families, where unresolved maternal pain reverberates across generations, shaping fractured identities and emotional dissonance. Insights from migration studies contextualize the emotional labor of diasporic mothers, highlighting how cultural displacement and alienation contribute to the silencing of maternal voices.

Empirical Inquiry: Understanding Maternal Marginality in Tamil Nadu

To bridge the gap between literary representation and lived experiences, the study incorporates empirical research through a questionnaire-based survey conducted across 38 districts of Tamil Nadu. This empirical inquiry aims to uncover the intimate particulars of maternal lives—the

unspoken burdens, emotional labor, and silent negotiations that shape the experiences of mothers navigating socio-cultural constraints. The questionnaire was carefully designed to elicit qualitative and quantitative responses, capturing a wide spectrum of maternal experiences that intersect with issues of gender, culture, and systemic inequities.

Questionnaire Design and Scope

The questionnaire was structured to explore key dimensions of maternal marginality, including:

- Emotional Labor and Invisible Sacrifices: Investigating the extent to which maternal responsibilities are emotionally and physically draining, with limited recognition or acknowledgment.

- Intergenerational Transmission of Caregiving Norms: Examining how caregiving roles and cultural expectations are reproduced across generations, perpetuating cycles of maternal sacrifice.

- Impact of Socioeconomic and Cultural Constraints: Analyzing how systemic inequities—rooted in poverty, lack of educational opportunities, and gendered expectations—shape maternal experiences and limit their autonomy.

- Emotional Burden: Exploring how unspoken trauma and emotional burdens are transmitted intergenerationally, leading to identity conflicts and psychological fragmentation.

The survey was conducted with 98 participants from diverse socio-economic backgrounds, capturing insights from mothers residing in urban, semi-urban, and rural settings. The participants, drawn from various regions across Tamil Nadu, provided rich qualitative and quantitative data that reflects the socio-cultural heterogeneity of maternal experiences in marginalized spaces.

Data Collection and Analysis

The data collected through the questionnaire was subjected to thematic analysis to identify recurring patterns and critical intersections between maternal marginality and systemic inequities. Thematic coding allowed for a layered exploration of maternal experiences, highlighting how maternal silence, emotional labor, and cultural expectations perpetuate cycles of marginalization.

- Qualitative Data: The open-ended responses were thematically analyzed to capture the nuances of maternal voices, revealing patterns of emotional labor, unacknowledged sacrifices, and the transmission of caregiving norms. These responses provided insights into maternal resilience, illuminating the emotional toll of sustaining cultural continuity across generations.

- Quantitative Data: Statistical analysis was employed to quantify key trends and correlations between maternal responsibilities and socio-cultural constraints. The quantitative data offered empirical validation of the thematic concerns explored in the primary texts, reinforcing the narrative of maternal marginality and adaptive survival strategies.

Bridging Literature and Lived Realities

By combining empirical data with literary analysis, this study establishes a dialogue between fiction and reality, demonstrating how diasporic literature serves as a mirror to the unarticulated struggles of marginalized mothers. The questionnaire data not only validates the thematic concerns explored in the primary texts but also expands the scope of inquiry by revealing hidden dimensions of maternal marginality that remain absent in mainstream discourses. This

convergence of textual and empirical insights reinforces the study's central argument: that diasporic maternal narratives are not merely fictional accounts but profound reflections of real-world struggles —a call to reclaim and amplify the voices of mothers relegated to the margins.

Through this interdisciplinary methodology, the study transcends conventional literary analysis by incorporating real-life experiences, ensuring that the voices of marginalized mothers are heard and validated. By weaving together feminist, postcolonial, and psychoanalytic frameworks with empirical data, this research offers a holistic and nuanced exploration of maternal marginality, highlighting the need to reimagine maternal identities as sites of both suffering and resistance. The combination of textual inquiry and empirical analysis provides a robust foundation for challenging dominant narratives and fostering a more inclusive understanding of maternal experiences—one that acknowledges the resilience, complexity, and transformative potential of maternal voices in shaping societal perceptions.

DISCUSSION and ANALYSIS:

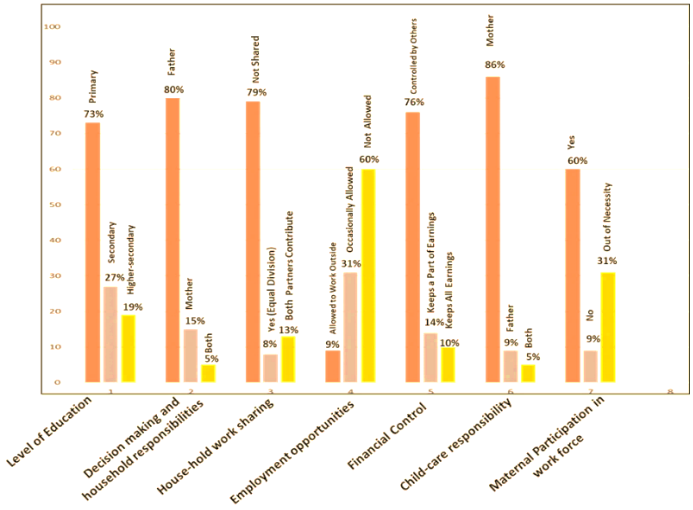
Understanding Maternal Marginality: A Silent Force at the Margins

Defining Maternal Marginality

Marginality, in the socio-cultural context, refers to the condition of being pushed to the periphery—excluded, invisible, and denied agency within dominant structures of power. In patriarchal societies, maternal marginality manifests as the systematic neglect, silencing, and disempowerment of mothers, reducing them to mere caregivers while stripping them of financial, social, and personal autonomy. Despite their central role in familial and societal well-being, mothers—particularly from underprivileged and marginalized backgrounds—face structural inequalities that restrict their decision-making power, financial independence, health awareness, and mobility.

The lived realities of mothers, especially in underprivileged communities, reveal how gendered power dynamics dictate maternal experiences. The research conducted across 38 districts of Tamil Nadu through a structured questionnaire involving 98 participants exposes the deep-rooted socioeconomic and gender disparities that shape maternal health, autonomy, and well-being. The findings illustrate how maternal identities are constrained by patriarchal norms, reinforcing their marginalization through educational gaps, financial dependence, unequal domestic labor, and societal pressures surrounding fertility and motherhood.

Figure 1. Correlation of Social Inequalities and Maternal Vulnerabilities Across Districts of Tamil Nadu



Source: Questionnaire circulated among the residents of the district

Maternal Marginality and Systemic Inequities: The Tamil Nadu Study

The survey data reveals the intersecting crises of maternal health and social inequalities, emphasizing how maternal identities are shaped by systemic exclusion, lack of agency, and rigid gender roles. The following factors contribute to the silent suffering of mothers:

1. Educational Marginality and Disempowerment

Education is a critical factor in determining women's agency. However, the data highlights a stark gender disparity in educational attainment among mothers: 73% of respondents have only attained primary education, while 27% have completed secondary education, and a mere 19% have pursued higher secondary education.

This educational gap restricts mothers from accessing financial independence, health literacy, and decision-making power, reinforcing their dependence on male authority figures. Without adequate education, women's ability to challenge patriarchal norms remains severely limited, leaving them vulnerable to systemic marginalization.

2. Lack of Decision-Making Power and Household Marginalization

Maternal roles are framed within hierarchical structures of authority, where decision-making power is overwhelmingly concentrated in male hands - 80% of major household and financial decisions are made by fathers, only 15% of decisions are made by mothers, and a mere 5% are jointly decided.

This gendered imbalance in authority relegates mothers to passive roles, where their voices remain unheard in critical aspects of their own lives, from family finances to health decisions.

Additionally, household responsibilities remain highly gendered - 79% of mothers state that household labor is not shared, only 8% report an equal division of labor, 86% of childcare responsibilities fall solely on mothers.

These statistics highlight how mothers are burdened with unpaid labor, reinforcing their invisibility within economic and social structures. The unrecognized, undervalued, and overwhelming burden of caregiving work keeps them trapped in cycles of exhaustion, dependence, and emotional labor.

3. Financial Marginality and Economic Dependence

Economic independence is a key determinant of agency. However, the data shows a severe restriction on maternal financial autonomy: only 9% of mothers are allowed to work outside the home, among those who do, 76% report that their earnings are controlled by others, only 10% have full financial control. This underscores how maternal identities are deeply entwined with economic exclusion, where even the ability to earn an income does not guarantee financial independence. The economic marginalization of mothers perpetuates their silence, leaving them with little to no agency in their own lives.

4. Maternal Health and Reproductive Pressures

Health awareness is another critical area of neglect: wherein 45% of respondents indicated a lack of awareness regarding their own health conditions, in 91% of cases, fathers control decisions regarding the age of first childbirth, 70% of respondents reported experiencing separation due to infertility, exposing the harsh societal pressure on women's reproductive functions.

These statistics illustrate how maternal health is not just a biological concern, but a gendered crisis, where women's bodies are regulated by patriarchal expectations of fertility and reproduction. The lack of autonomy over their own reproductive choices further exacerbates their marginalized status within both domestic and societal spaces.

Maternal Marginality: The Invisible Backbone of Society

Despite bearing the emotional and physical labor of family life, mothers remain unacknowledged and undervalued. The intersecting crises of educational deprivation, financial dependence, unpaid labor, and reproductive oppression illustrate how maternal marginality is both a structural and psychological condition—a silent force that sustains the very systems that exclude them.

The Tamil Nadu study provides empirical evidence of how maternal identities are shaped by systemic neglect and patriarchal control, reinforcing the idea that marginality is not merely about exclusion but about the ways in which women are forced into silence while being essential to societal functioning. The invisible suffering of mothers is not an isolated occurrence—it is an embedded reality across cultural contexts, making the recognition and redefinition of maternal agency an urgent necessity.

4.2. Theoretical Framework: An Interdisciplinary Lens on Maternal Agency

Maternal agency has long been relegated to the periphery of feminist discourse, often overshadowed by discussions of autonomy that prioritize individualism over relational identities. This study reclaims motherhood as a site of both vulnerability and resistance, drawing on psychoanalytic feminism, trauma theory, and feminist ethics of care to explore how maternal figures in literature subvert, negotiate, and reimagine their roles within patriarchal structures. Through the works of Nancy Chodorow, Judith Butler, Carol Gilligan, and Marianne Hirsch, this interdisciplinary framework challenges the traditional portrayal of

mothers as either silent nurturers or rebellious outliers. Instead, it posits maternal agency as fluid, adaptive, and deeply embedded in intergenerational relationships.

4.2.1 Feminist Psychoanalysis: The Cultural Reproduction of Motherhood

Feminist psychoanalytic theory provides critical insight into how maternal roles are constructed, internalized, and perpetuated across generations. Nancy Chodorow's The Reproduction of Mothering argues that motherhood is not merely a biological function but a cultural inheritance, passed down through patterns of caregiving and emotional labor. In patriarchal societies, the mother-daughter relationship becomes a primary site where gendered expectations are reinforced, often trapping women in cycles of self-sacrifice.

Literary texts such as Chitra Banerjee Divakaruni's *Before We Visit the Goddess* and Amy Tan's *The Joy Luck Club* exemplify this transmission of maternal identity. Their protagonists—whether Sabitri, Anju, or Lindo Jong—navigate a world where love is inextricably linked to duty, and where maternal presence is simultaneously a source of empowerment and oppression. Psychoanalytic feminism allows us to see how these maternal figures internalize their own marginality yet also carve out forms of agency within these limitations.

4.2.2 Trauma Theory: The Maternal Body as a Site of Intergenerational Wounds

Building on psychoanalytic perspectives, trauma theory helps unpack the maternal experience as one shaped by personal and inherited pain. Marianne Hirsch's concept of postmemory highlights how the unspoken traumas of mothers become the psychological inheritance of daughters, creating fragmented identities across generations. These traumas—ranging from migration and displacement to gendered violence—manifest in both physical and emotional estrangement between mothers and daughters.

In The Bonesetter's Daughter, LuLing's silences become Ruth's inherited anxieties, while in *Sister of My Heart*, Sudha and Anju grapple with the weight of their mothers' unfulfilled desires and suppressed histories. These narratives illuminate how maternal trauma is not simply a private affliction but a communal burden, shaping familial relationships across generations. Rather than reducing mothers to tragic figures, trauma theory allows for a nuanced exploration of how maternal pain fuels both suppression and resilience.

2.3 Feminist Ethics of Care: Rethinking Maternal Power

Traditional feminist discourses often frame maternal sacrifice as a form of patriarchal oppression, yet Carol Gilligan's ethics of care offers an alternative perspective—one that reclaims caregiving as an assertion of moral and emotional strength. Unlike dominant ethical frameworks that prioritize detachment and autonomy, the ethics of care values relational interdependence, emotional labor, and nurturing as forms of power rather than subjugation.

The mothers in *Queen of Dreams* and *The Kitchen God's Wife* embody this redefined maternal agency—one that operates within, rather than against, patriarchal constraints. Their care is neither passive nor self-effacing; rather, it becomes a subversive force that sustains, protects, and ultimately shapes the identities of the next generation. By applying Gilligan's framework, this study challenges the notion that maternal devotion is inherently restrictive, instead highlighting how caregiving itself can become a radical act of self-definition and cultural continuity.

4.3 Maternal Agency: A Fluid Space Between Constraint and Resistance

By integrating psychoanalytic feminism, trauma theory, and ethics of care, this study reframes maternal agency as neither silent endurance nor outright defiance. Instead, it positions motherhood as a dynamic space where women negotiate identity, power, and survival. Whether in diasporic literature or real-world experiences, mothers are not merely victims of systemic oppression—they are architects of resilience, memory, and transformation.

The theoretical framework outlined above—drawing from feminist psychoanalysis, trauma theory, and the ethics of care—finds rich application in the maternal narratives of Chitra Banerjee Divakaruni and Amy Tan. Their novels, shaped by cultural dislocation, intergenerational trauma, and gendered expectations, offer compelling insights into how maternal agency is expressed, suppressed, and reclaimed in Indian and American diasporic contexts. While Divakaruni's Indian mothers grapple with tradition, honor, and silent endurance, Tan's Chinese American mothers confront assimilation, memory loss, and fractured maternal legacies. In both cases, the mother-daughter bond becomes the central site of negotiation, where trauma, love, and cultural inheritance collide.

4.3.1 **Indian Context: Chitra Banerjee Divakaruni's Maternal Narratives**

Divakaruni's works—*Before We Visit the Goddess, Sister of My Heart*, and *Queen of Dreams*—paint a complex portrait of maternal figures navigating the weight of cultural expectations and personal sacrifice. These narratives highlight how mothers exist in liminal spaces, bound by familial duty yet yearning for self-expression, trapped between generational continuity and the need for personal agency.

A) Maternal Silence and the Weight of Tradition:

In *Sister of My Heart*, the matriarchs Nalini, Gouri, and Pishi carry the burden of familial honor, enduring secrecy, social scrutiny, and gendered restrictions to ensure their daughters' futures. Their silence, far from being mere submission, becomes a tactic of survival—an echo of Nancy Chodorow's theory that maternal figures, despite being marginalized, wield power through indirect influence.

B) Intergenerational Trauma and Inherited Grief:

Before We Visit the Goddess explores how mothers and daughters misunderstand each other across generations, with Sabitri, Bela, and Tara embodying the fractured transmission of maternal wisdom and pain. As trauma passes through unspoken words and suppressed emotions, Marianne Hirsch's concept of postmemory comes into play—the past lives on, shaping the self even when it is not fully known or understood.

C) The Search for Maternal Identity in the Supernatural and Spiritual:

Queen of Dreams reimagines maternal identity through dreams, mysticism, and self-erasure. The protagonist Rakhi struggles to comprehend her mother's enigmatic world, reflecting how maternal figures, even when physically present, can be emotionally and psychologically distant. This aligns with trauma theory's assertion that unresolved maternal suffering often manifests in ghostly absences, half-told stories, and fragmented memories.

Divakaruni's narratives thus challenge conventional portrayals of Indian motherhood, portraying it as a space of negotiation between silence and power, trauma and resilience. The mother figures may not always articulate their desires, but they shape their daughters' worlds in profound and enduring ways.

4.3.2 American Context: Maternal Silence and Assimilation in Amy Tan's Narratives

Amy Tan's *The Joy Luck Club*, *The Bonesetter's Daughter*, and *The Kitchen God's Wife* explore the struggles of Chinese immigrant mothers and their American-born daughters, revealing the deep fractures caused by migration, cultural loss, and linguistic dissonance. Unlike Divakaruni's mothers, who navigate social restrictions within India, Tan's maternal figures must contend with the alienation of exile, where language itself becomes a battleground for maternal authority and identity.

A) The Language of Maternal Silence:

In *The Joy Luck Club*, mothers like Lindo Jong and An-mei Hsu struggle to pass down their histories to daughters raised in a foreign culture. The linguistic gap between Mandarin and English mirrors the psychological distance between generations, reinforcing Judith Butler's concept that identity is constructed through discourse. The daughters, accustomed to American individualism, often dismiss their mothers' wisdom—only to later recognize the subversive strength embedded in their maternal silences.

B) Maternal Trauma and Memory Loss:

The Bonesetter's Daughter presents the maternal body as a repository of trauma, where LuLing's Alzheimer's disease serves as a metaphor for cultural erasure and unspoken pain. As her memories fade, so too does the connection to her past, aligning with Marianne Hirsch's theory of postmemory—how trauma continues to shape descendants even when the details remain elusive.

C) Sacrificial Motherhood and the Burden of Cultural Transmission:

The Kitchen God's Wife portrays how immigrant mothers sacrifice personal happiness for their children's futures, embodying Carol Gilligan's ethics of care. Winnie Louie, despite enduring an abusive past and an arranged marriage in China, constructs a new life in America for her daughter, Pearl, reflecting the maternal resilience that exists even in narratives of suffering.

Tan's works foreground the invisibility of maternal suffering, illustrating how immigrant mothers, while often dismissed as passive relics of the past, are in fact active agents of cultural survival and transformation. Their power does not always reside in what they say, but in what they withhold, endure, and ultimately pass down.

4.4 Toward a Universal Understanding of Maternal Agency:

While Divakaruni and Tan focus on Indian and Chinese maternal figures, their narratives speak to a broader, universal struggle—that of mothers across cultures balancing love, duty, trauma, and selfhood. Their works reject the binary of the selfless mother versus the rebellious woman, instead portraying motherhood as a complex interplay of constraint and defiance, love and loss, silence and survival.

By applying psychoanalytic feminism, trauma theory, and ethics of care, this study reclaims the maternal figure from the margins of literary discourse, arguing that motherhood is neither a passive role nor a predetermined fate, but a dynamic site of negotiation, resilience, and quiet revolution.

Conclusion: Maternal Marginality as a Catalyst for Societal Change

The exploration of maternal marginality in both Indian and American diasporic narratives reveals that mothers are not merely passive figures bound by tradition and silence, but active agents of resilience, adaptation, and cultural transmission. This study challenges the historical erasure of maternal voices, arguing that maternal narratives are sites of quiet resistance and innovation, shaping individual identities and societal structures alike.

Reclaiming Maternal Voices

The portrayal of mothers in Chitra Banerjee Divakaruni's and Amy Tan's works highlights a pattern of endurance, sacrifice, and subversion—one that has often been overlooked in dominant literary and cultural discourses. Through an interdisciplinary lens that integrates feminist psychoanalysis, trauma theory, and ethics of care, this study reframes maternal identity as an active force rather than a static, subjugated position.

Rather than being confined to silence and suffering, these mothers utilize alternative forms of expression—memory, dreams, rituals, and non-verbal communication—to pass down their experiences and reshape their children's worlds. Their presence, whether through physical endurance or posthumous influence, defies erasure, asserting itself as an unbreakable thread that links past, present, and future generations.

Amplifying Marginalized Narratives

By foregrounding maternal marginality in diasporic literature, this study illuminates the transformative power of storytelling as a medium of societal change. Literature, particularly narratives of maternal suffering and resilience, acts as a catalyst for social consciousness, bringing to light the intersections of gender, migration, trauma, and agency.

Both Divakaruni's and Tan's novels challenge hegemonic representations of motherhood, offering instead a nuanced, intersectional understanding that acknowledges the burdens of displacement, assimilation, and cultural estrangement. These narratives not only critique oppressive structures but also offer alternative pathways for understanding maternal strength and identity, advocating for a world where maternal voices are recognized as central to cultural and social evolution.

Toward Inclusive Narratives

Recognizing the emotional labor and resilience of mothers, this study calls for a restructuring of societal perceptions—one that acknowledges maternal figures as more than caregivers or cultural custodians. The maternal experience is not a monolith, but a complex and dynamic space of negotiation, adaptation, and defiance.

To move toward more inclusive narratives, one must challenge restrictive definitions of motherhood that confine maternal figures to self-sacrificial roles, advocate for more literary and scholarly attention to diasporic maternal experiences, ensuring that these narratives are not overshadowed by dominant patriarchal or colonial frameworks and recognize maternal agency beyond biological determinism, embracing maternal figures as intellectual, emotional, and cultural architects of change.

Ultimately, this research positions maternal marginality as a lens for societal transformation, urging future studies to expand the discourse on maternal agency, intergenerational trauma, and cultural hybridity. By centering the voices of mothers who have long been relegated to the

margins, we forge a path toward a deeper, more inclusive understanding of identity, heritage, and human resilience.

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Relationships Between Individual Attitude and Personality Traits

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Abstract. The nature of the relationships between personality traits and personal attitudes has been a crucial and long-lasting issue for humans. For this basic and important reason, there is a demand to know whether individual personality affects the personal attitude to be formulated. Because of this, we aimed to find out how individual attitudes and personality traits are related to each other. A total of 41 informants aged 19-23, who are in the third year of the university in the accounting major, participated as informants in this study. Data collection was managed according to Bernard M Bass' online questionnaire for determining personal attitude. The data were classified into self-oriented, communication-oriented, and business-oriented attitudes and accounted for 36%, 35.7%, and 28.3%, respectively, through the typology analysis. The respondents' personality traits were analysed based on the psychological test, developed by C. Jung, which resulted in introverted- 41%, ambiverted- 32%, and extroverted- 27% in an Excel Sheet. The research findings were supported by the Theory of Personality and the Self-Perception Theory of Attitudes.

Keywords*: personality traits, individual attitude, Carl Jung's Personality theory, Bernard M Bass' psychological test*

Introduction

As the world we live in becomes increasingly dynamic and globalized, both personal intelligence and ethical issues require a deeper understanding of how we are connected and interdependent in one world. One of the clear examples of this is that scientists from many countries have created many research projects that raise the issue of individual ethics and attitudes. Dealing with such human development matters and gaining an understanding of the ethical issues related to individuals has demanded conducting research in various fields of study.

The purpose of the research: The purpose of the paper was to investigate correlations in how the individual's attitude is related to personal characteristics.

Research objectives: Within the framework of the primary goal, the research objectives were designed as follows: 1) to define individual personality by the Carl Jung test; 2) to identify individual attitudes through Bernard M.Bass' test; 3) to investigate relationships between individual attitudes and personalities.

Literature review. In today's era of rapid technological advancement and the information age, interpersonal communication has become more important than ever before. As a result, the issue of personal development has come to the forefront of social attention. Extensive research is being conducted on how individual attitudes and personal growth influence various aspects of social interaction, including the manifestation of both positive and negative outcomes.

A meta-analysis of the relationship between personality traits and values was conducted by Laura Parks-Leduc in 2014, based on 60 studies. It was supported by the Five-Factor Model (FFM) of personality traits and Schwartz's value theory. The finding has shown that there was

a stable association, but generally weak. This suggests that personality traits and values are distinct constructs (Laura Parks-Leduc, 2014). The study applied that cognitively-based personality traits have a stronger relationship with values, while emotionally-based traits have a weaker relationship.

A researcher, Rahul Kumar (2020), conducted a study to demonstrate that self-efficacy and self-esteem play a statistically significant role in shaping university students' attitudes and decision-making regarding their choice of learning format based on the 'Big Five' personality traits (Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism) framework (Kumar, 2020). According to Bentea (2015), the relationship between teachers' attitudes toward their work and typological tendencies of personality, or dominant personality traits, showed that typological dimensions were statistically significantly related to work attitudes. Furthermore, differences in work attitudes were observed depending on the intensity of personality traits (Bentea, 2015).

Taiwanese researchers Chia-Hung Tsai, Ching-Hsing Wang and others have analyzed the impact of the Big Five personality traits on individual attitudes toward the issue of Taiwan's independence and unification. Based on their primary data, the findings show that extraversion and openness to experience are statistically significantly associated with individual attitudes toward the independence–unification issue (Weng, 2019).

As we can see from the above literature, individual personality traits have been studied concerning personal values, as well as their impact on jobs, leadership skills, and attitudes toward national independence, using various approaches, including the Big Five personality traits model.

This study contributes to the understanding of how classical personality typologies (Jung) interact with attitude orientations (Bass) in the unique social and educational context of Generation Z students in Mongolia. By identifying a dominant pattern of introversion correlating with self-oriented attitudes in this demographic, the research extends traditional typology models into a new generational and cultural context, which has not been sufficiently explored in prior literature. Most prior studies (e.g., Kumar, Weng, Bentea) focused on workplace attitudes, national identity, or learning preferences. However, this study connects introversion with self-orientation and ambiverts/extroverts with communication orientation, specifically in the academic peer-interaction context of Gen Z students**.** There is a notable lack of research applying Bass's attitude typology in education settings or non-Western cultures—this is a niche of this research.

Big Five Personality Traits (McCrae & Costa), while Jung's typology provides a structural foundation, the observed dominance of introversion aligns with lower Extraversion scores typically found in Gen Z cohorts, as suggested by contemporary Five-Factor Model (FFM)-based studies (P.T, 1999). Person-Environment Fit Theory (Kristof-Brown, 2005) discusses how personality-attitude alignment impacts academic group dynamics and motivation in classroom settings. From a person-environment fit perspective, students whose personality traits align with communication-oriented attitudes may foster more collaborative learning environments, especially in team-based academic settings. Self-Determination Theory (Deci, 2000) was used to enrich the discussion of self-oriented vs. communication-oriented attitudes by exploring how autonomy vs. relatedness needs might explain the patterns found. The prominence of self-oriented attitudes among introverts may reflect a strong orientation toward intrinsic motivation and autonomy, consistent with principles of Self-Determination Theory.

Methodology: In the frame of research objectives 1 and 2, the standardized attitude questionnaires of B.M. Bass and C. Jung's personality tests were used as the main tools to collect data. The standard questionnaires were delivered to the target informants, 41 students who are in the third year of tertiary level in the Accounting major, via the Google Form platform, to reach the primary goal of the study. The test keys were given to the respondents to

explore for themselves. According to objective three, correlation of the test results was performed on SPSS software. The findings of the research were evaluated and summarized by descriptive and inferential methods. This study employed a non-experimental, correlational research design. As such, it seeks to identify statistical relationships between personality traits and attitude orientations without implying causation. The research results were supported by the Theory of Personality (Dorjjav, 2005) and the Self-perception theory of attitudes (Personality test , n.d.). Both Jung's typological personality assessment and Bernard M. Bass's orientation questionnaire have been widely utilized in psychological and educational research. Jung's model has shown good internal consistency and test-retest reliability in various populations (C.Jung's Personality Test, 2015). Bass's attitude questionnaire has also been validated in prior studies related to work motivation and interpersonal orientation (Olufemi, 2012).

Results. All the personal and individual characteristics that exist in humans are comprehensively reflected, regardless of whether those characteristics are manifested or not. Personality is one of the indicators of an individual characteristic that considers the integral identity of a particular subject. Differences in the characteristics of human personality depend greatly on the person's age, gender, living environment, ethnicity, and social norms in that society. The types of personality commonly used in the practice of psychology were developed by the Swiss psychologist Carl Jung through Personality theory that saw three universal types in human personality those are introvert, ambivert, and extrovert. An introverted personality is not shown openly. People of this type are focused on their inner world. They think carefully before expressing ideas, and prefer to be alone in a quiet and peaceful environment. They are energized by such quiet situations. The characteristics of extroverts are in contrast to introverts. They prefer the outer world and interaction with people rather than being alone. They are sociable and get energized by interacting with people. Ambivert (Intermediate) people exhibit mental functioning intermediate between extroverted and introverted personalities (Oyundalai.N, 2017).

In the other aspect, individuality is logically and morally prior to society. Individuals as members of a society have complex psychological characteristics that is reflected in the social environment, and social relations. The social members' moral actions, those are significant for other people and oneself, are manifested through various types of attitudes. In brief, individuals have differed from each other as their intelligence, creativity, and interests are measured through attitude values. An individual's attitudes are commonly evaluated by the B.M.Bass' test which consists of 27 questions. This orientation questionnaire identifies what is important for a person, that is, for what purposes (for himself, for a task, or for interacting with other people) a person spends the greatest amount of his energy. According to the aptitude test, human attitudes are divided into three typologies as bellowed in the following.

1. Self-oriented attitude / 'I' attitude/ - is associated with the human interaction of loving direct reward and satisfaction regardless of other social partners, anxiety, arrogance, competitive interest for power, and in achieving status.
2. Communication-oriented attitude / 'We' attitude/ - is associated with the communication of interacting and working with people in any situation of most cases. People with this type of attitude are dependent on a group and have a weak ability to complete certain tasks alone.
3. Business-oriented attitude / 'work' attitude/ - is referred to people who perform work better, and solve business problems (News, 2021).

Self-perception theory of Attitude change was used to support the research findings. (Olufemi, 2012)

The personality test (C.Jung's personality test, 2015) was performed by 41 junior students, aged 19-24, who have a shared goal to explore their characteristics under the test guide and classified according to C.Yung's model.

This section presents the key findings of the study, including the distribution of personality types, attitude orientations, and the correlations between them. Interpretations and implications are discussed in the following section

Table 1. Personality types of individuals

	Participants	Scores	Persons	Percentage
Introverted	1, 4, 5, 8, 9, 16, 17, 21, 22, 23, 26, 28, 29, 31, 33, 35, 37	1-7	17	41.5%
Ambiverted	2, 3, 11, 12, 13, 14, 19, 20, 25, 27, 30, 34, 40	8-14	13	31.7%
Extroverted	6, 7, 10, 15, 18, 24, 32, 36, 38, 39, 41	15-20	11	26.8%
Total			41	100%

As seen from Table 1, the 3 types of personality trait percentages were shared at approximate levels of 41.5%, 31.7%, and 26.8% respectively. However, The results showed that 17 out of 41 students (41.5%) were classified as introverted, indicating a tendency to be more reflective and reserved when sharing ideas with peers. They react little to the needs of other students in the classroom. In terms of the extroverted, the result has shown that there is not much desire for emotional relationships among them. This circumstance has implied that the students communicate carefully with each other during their study and the learning environment needs a more judging and peaceful atmosphere. All reactions among the group members are supported by the personality theory as focusing on the interplay between the conscious and unconscious mind of the learners and as inherited phenomena as well. Overall, exploring individual personality types was significant for the students to understand themselves better in the group.

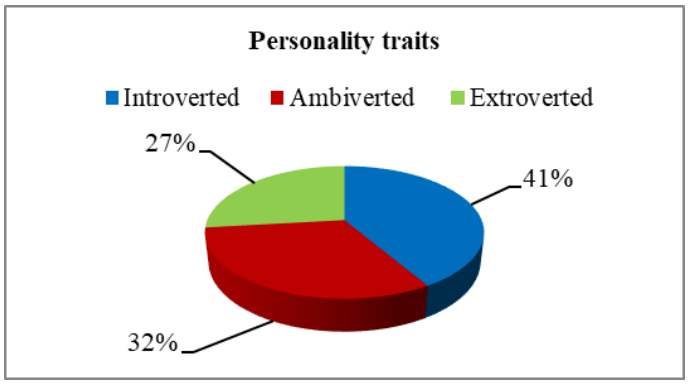

Figure 1. Personality traits of the individual participants

In terms of the target group students' attitudes, B.M.Bass' orientation questionnaire, which has 27 questions, was used to find out the personal attitudes (Personality test , n.d.) of the individual learners. Students did the test under the task guide that they should choose the greatest extent and the most distant opinions from reality. The test result was calculated in the system according to the methodology of B.M.Bass and shown to the informants directly after submission.

Table 2. Attitude types of the individual participants

Participants	**Self-Oriented attitude**	**Communication-Oriented attitude**	**Business–Oriented attitude**	**Attitudes per person**
1.				BO
2.				CO
3.				SO
4.				CO

5.				SO
6.				CO
7.				CO
8.				SO
9.				SO
10.				CO
11.				SO
12.				CO
13.				CO
14.				BO
15.				CO
16.				SO
17.				SO
18.				SO
19.				SO
20.				BO
21.				SO
22.				BO
23.				SO
24.				CO
25.				BO
26.				SO
27.				SO
28.				CO
29.				SO
30.				CO

31.				SO
32.				CO
33.				SO
34.				BO
35.				CO
36.				SO
37.				CO
38.				SO
39.				CO
40.				CO
41.				CO
Σ	**18**	**17**	**6**	**41**
%	**36%**	**35,7%**	**28,3%**	**100%**

*SO-Self-Orientation **CO- Communication-Orientation ***BO-Business-Orientation

From Table 2, the descriptive summaries were done under the following attitude formula at the group level.

1. SO>CO>BO formula, which resulted in 36%, as the highest percentage, has identified that these students have a self-focused attitude. They prefer to strive for personal superiority and well-being.
2. SO< CO> BO, which was calculated at 35.7%, has shown that learners have attitudes to be sociable and ready to discuss in the team. This percentage can have a good impact on maintaining positive relationships within the group.
3. SO<CO<BO accounted for 28.3% and referred to a Business-oriented attitude that values work. This was the lowest percentage of students who may not work hard in their studies.

Overall, the distribution of attitude types among participants showed no significant variation, which appears to be a typical pattern in similar student populations. Identifying and assessing students' attitudes helped enhance their self-awareness and understanding of how personal traits influence group collaboration and shared academic goals.

The personality and attitude test results were correlated in the following Table 3 as demonstrated.

Table 3. Correlations between an individual's attitudes and personality traits

	Introverted personality	Ambiverted personality	Extroverted personality	Total
Self-Oriented attitude	11	4	3	18
Communication-Oriented attitude	4	5	8	17
Business–Oriented attitude	2	4	-	6
Total	17	13	11	41

The result has shown that 17 students out of 41 (41.4%) are introverted, which occupied the highest percentage among the other two. However, the students, who have SO (I) attitude, occupied 43.9%, the highest in the group, amounting to 18 participants. This result has indicated that students who have introverted personalities and self-oriented attitudes are being dominated in the group. In detail, 11 introverted (64.7%), 8 extroverted (72.7%), and 5 ambiverts (38.5%) persons have self-oriented (61.1%), and communication-oriented (76.5%) attitudes, respectively, having the highest percentages. This estimation has demonstrated that introverted people have self-oriented attitudes, but people who are extroverted and ambiverted can have more communication-oriented attitudes. It is explained that there is a parallel relevance between individuals' personalities and attitudes. On the other hand, no one who is extroverted has a business-oriented attitude. It seems to be related to the inherited characteristics of extroverted people that they make decisions emotionally and easily in terms of the fundamentals of the personality theory. These findings set the stage for a deeper analysis of how personality traits influence attitude orientations, which is explored in the discussion section.

Discussion

In this section, the findings are interpreted in light of existing literature and psychological theory, with a focus on understanding the implications for personality-attitude alignment among Gen Z students. The study's findings offer an original contribution by contextualizing classical personality theory within the educational experiences of Gen Z learners in Mongolia. This generational lens introduces new insights into how self-perception and personality align in digitally mediated, culturally specific academic settings. These results also complement and extend previous research grounded in the Five-Factor Model by showing how introversion, a trait shared across both Jungian and FFM perspectives, aligns with self-oriented attitudes that emphasize individual achievement and personal agency.

According to the human personality theory, the age and professional selection of the participants are the considerable characteristics to evaluate the research findings. Learners at the age of 19-23, who are referred to as Gen Z, have their own way of interacting with society in terms of their personality and attitude formation. Students who have introverted personalities and self-oriented attitudes are being dominated in the group implies that introverted persons are energized by their internal power to motivate their well-being and prestige by keeping themselves busy with their feelings and life experiences to form self-oriented attitudes. The professional major of the learners is one of the important factors to define the learners' personality because of their professional choice, which is based on their core characteristics of personality. That's why it is inferred that students majoring in accounting may exhibit more introverted personality traits, often characterized by a preference for introspection and a tendency to express ideas based on internal reasoning and factual analysis. In terms of the communication-oriented attitude as a We-attitude, ambiverted and extroverted learners, as socially-minded and independent thinkers, have influenced in shaping of a healthy and equitable environment in the future of the group. While the findings reveal statistically significant associations, it is important to emphasize that causality cannot be inferred due to the correlational design of the study.

In line with Self-Determination Theory, the prevalence of self-oriented attitudes among introverted students may be interpreted as a drive for autonomy and competence, while the communication orientation of ambiverts and extroverts reflects a need for relatedness. Future research could explore how these motivations influence academic engagement and collaboration outcomes.

Research limitations: This study was limited by its small, homogenous sample of third-year accounting students from a single institution, which may constrain the generalizability of the findings. Future research should include larger and more diverse samples across disciplines and universities to validate and expand these findings. As the data were collected through self-administered online tests, there is a potential for response bias due to lack of supervision or environmental control. Future studies could enhance reliability by administering the tests in proctored settings or using mixed-method approaches.

Conclusion

Attitude and personality are two fundamental aspects of human behavior that shape how individuals perceive and interact with the world.

Both concepts of individual personality and attitudes were interrelated because of the stable and dynamic actions. The result of the study has shown that human personality and attitudes are backed up by one by and affected by each other. Understanding the attributes of attitude and personality can provide valuable insights into human behavior, decision-making processes, and interpersonal dynamics.

In this study, the sampling was limited in terms of both in small research area and population. Further, it would be extended in an interdisciplinary context.

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Examining the Effectiveness of Circle of Security Parenting© Program™: Sample of Mongolian Parents

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Abstract. Researchers have found that young children have securely attached relationships with parents, tend to have healthier social skills and support the development of their emotion regulation and stress response systems. Internationally recognized the Circle of Security©-Parenting™ (COSp) program, which was developed by Bert Powell, Glen Cooper, and Kent Hoffman, is designed to investigate this with Mongolian parents and determine the results. The COSp program is comprehensive, with interactive video lessons and psychological education manuals based on attachment theory. It is designed to support parents' ability to understand and connect with their child's emotional needs and address any issues related to parenting. The study involved 33 parents who had children aged 0-5 years, divided into experimental and control groups. The program was implemented over 8 weeks with two experimental groups comprising 8-9 participants. Outcomes were measured using the Parenting Stress Index - Short Form (PSI-SF Albidin) and the COSp questionnaire, pre-test and post-test. As a result of the study, parents who participated in the COSp program had decreased parental distress (PSI) and improved some parenting skills.

Keywords: *Attachment theory, Circle of Security, Parenting program, Parent stress index.*

Introduction

Establishing a secure attachment with parents is not just essential for the present, but it also paves the way for children to learn how to regulate their emotions, respond effectively to stress, and develop social competence in the future (Hoffman, Cooper, & Powel, COSI, 2024). Attachment is an innate neurobiological system in the relationship between a child and their caregivers. A secure attachment develops when a child feels safe and protected by their parents (Kubo, Sayaka, Toshifumi, & Kishimoto, 2021).Parental influence plays a vital role throughout a child's life, and as research deepens in this area, parenting programs and training for parents are increasingly expanding (Lavery, 2018). Numerous research and structured parenting programs based on attachment theory have been developed for parents (Pazzagli, Laghezza, Manaresi, Mazzeschi, & Powell, 2014). According to research by Allan Schore and Daniel Siegel in 2012, parenting education not only helps build models that solve more complex issues

rooted in attachment and social neuroscience but may also serve as a way to address challenges in the parents' attachment behavior systems and intergenerational issues (Gilhooly, 2018).

Although attachment theory originated within Western psychological traditions, its core principles—such as emotional safety, caregiver sensitivity, and the need for a secure base—are considered universally relevant (Keller, 2013). Mary Ainsworth, one of the key developers of attachment theory, conducted foundational research in Uganda with mothers and infants, illustrating that attachment behaviors can be observed across cultures. Recent domestic studies in Mongolia have also highlighted the importance of secure attachment in child and adult outcomes. Insecure attachment has been associated with depressive symptoms and behavioral problems in children, while secure attachment contributes to positive emotional development, peer relationships, and important soft skills like decision-making and collaboration (Badamtsetseg, 2020; Budaltsolmon, 2023; Dulguun, 2021).

A baseline study conducted in 2017 by the Ministry of Education, Culture, Science, and Sports of Mongolia revealed that many parents in Mongolia generally lack knowledge about effective child-rearing practices. They do not prioritize this development aspect sufficiently and often delegate their children's growth and education responsibilities to teachers and schools. In addition, the growing dependence on smartphones and technology has resulted in decreased face-to-face communication and involvement in child upbringing (Erdenetsetseg, 2017). The government of Mongolia has already made the necessary step in this direction by approving the 'Early Childhood Development Support' program, which promotes such development as well as the need to prevent and reduce violence in childhood. This program highlights the significance of allowing parents to establish a relationship of togetherness, support, and safety with their babies and toddlers in their family environment (Mongolia, 2023). A study commissioned by the Family, Child, and Youth Development Agency found, through interviews with general education teachers, that there is a significant need to develop modular programs and training on child development and parenting for parents (Tumennast, бас бус., 2019).

Based on the research outlined above, it is evident that a structured parenting education program is needed in Mongolia. To address this, we plan to evaluate and further investigate the implementation of the internationally recognized "Circle of Security Parenting™" (COSp) program for parents in Mongolia.

Literature review

The Circle of Security® – Parenting™ (COSp) program, based on Attachment Theory developed by John Bowlby and Mary Ainsworth (Goldberg, Muir, & Kerr, 2000), is gaining traction worldwide (Gerdts-Andresen, 2021). The initial Circle of Security Intervention (COS-I) study was conducted in 2006 over a 20-week period with parents from high-risk groups who had toddlers and preschool-aged children. In this study, the children's attachment classifications were determined using the Strange Situation Procedure (SSP) developed by Mary Ainsworth in 1970 (McLeod, 2024) (Hoffman, Cooper, Powell, & Marvin, Changing Toddlers' and Preschoolers' Attachment Classifications: The Circle of Security Intervention, 2006).

The Circle of Security Interview (COSI) method was used to assess the parents' attachment styles and internal working models as part of the intervention. Based on these assessments, individualized treatment plans were developed for each participant. The COSI assessment tool

is a semi-structured interview comprising 25 questions and is based on the Adult Attachment Interview (AAI) (George, 1984) and the Parent Development Interview (PDI) (Aber, 1985). The official eight-week Circle of Security Parenting (COSp) program was introduced in 2010. Since its release, it has been translated into 24 languages and has over 35,000 trained facilitators worldwide (COSI, 2022). For instance, in Australia, government-affiliated organizations such as the Australian Institute of Family Studies and the Child and Adolescent Mental Health Service (CAMHS) in Western Australia officially recognize the program. This recognition is a testament to the program's collaborative nature, which is facilitated by professionals, including social workers, teachers, and psychologists (Maxwell, 2020). In Norway, since 2010, over 2,000 professionals—including psychologists, social workers, school nurses, and child protection officers—have integrated the program into their daily work (Gerdts-Andresen, 2021).

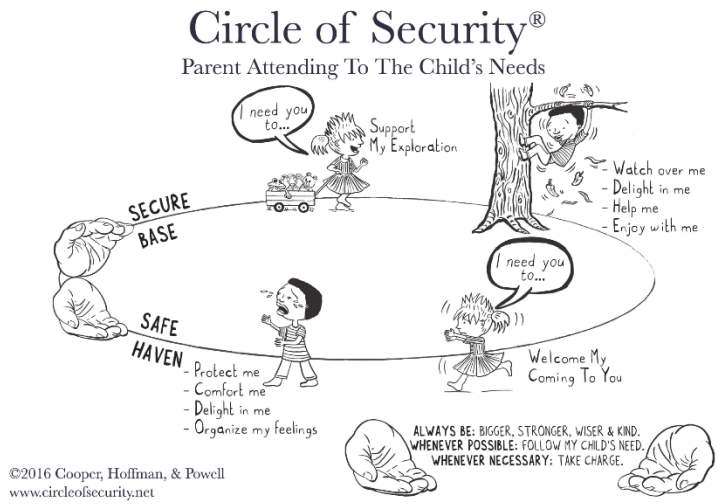
Caregivers participating in the COSp program showed decreased stress, anger, and fear (Kohlhoff, Stein, Ha, & Mejaha, 2016). Similarly, the study by Gerdts-Andresen (2021) found that parental stress decreased, self-efficacy improved, parenting skills increased, and parents' understanding of their children's behavior enhanced after participating in the program (Gerdts-Andresen, 2021). In a 2007 case study conducted by Harvard University psychologist Professor Karlen Lyons-Ruth, it was demonstrated that attachment interactions between a mother and child could not occur effectively when both were under stress (Lyons-Ruth & Spielman, 2004).

One of the program's core values is embodied in the phrase: "Good enough parenting is our mandate" (Hoffman, Cooper, & Powell, 2017). At the end of the program, parents are awarded with a certificate that reads "Good Enough Parent". The term "Good Enough Mother" was coined by British psychoanalyst Donald Winnicott (1896-1971) in 1953 in a radio broadcast. This concept includes the ideas below:

- Doing his/her best is sufficient; striving for perfection often leads to difficulties.
- Being "good enough" is a foundation for a child's growth and development.
- Endeavoring to be a perfect parent can hinder a child's ability to learn, gain independence, and build self-confidence. (Holford, 2020).

The concept of "good enough parenting" is relevant and beneficial for all parents. By acknowledging that perfection is not necessary, parents can become happier and more self-confident, leading to a more fulfilling parenting experience (Gilhooly, 2018) points out that if parents were perfect and never made mistakes, children might focus more on their parents' actions rather than voicing their own needs and desires (Hoffman, Cooper, & Powell, 2017).

The Circle of Security Parenting program is a relationship-based intervention designed to foster secure attachment in children by addressing the parents' internal working models. Within the framework of Attachment Theory, John Bowlby identified three key behavioral systems in young children: attachment, caregiving, and exploration. The COS program visually represents these systems through a hand-drawn "Circle" diagram (Figure 1), making it easier for therapists, parents, and caregivers to understand (Powell, Cooper, Hoffman, & Marvin, 2014). Additionally, in line with Bowlby's (1988) view that caregivers should provide protection and emotional attunement, the program helps parents understand and embody these qualities. In COS, these caregiver characteristics are presented simply as: *Bigger, Stronger, Wiser, Kind* (Powell, Cooper, Hoffman, & Marvin, 2014). The Circle encapsulates children's fundamental needs within the three attachment-related behavioral systems, equipping parents with a tangible "map" (Figure 1) to adeptly identify and meet their child's needs and desires (Anna Huber, Erinn Hawkins, Glen Cooper, 2018).



Within the framework of attachment behavior systems, children require protection and comfort, while within the framework of exploratory behaviors, they need to explore and learn. These two systems are inversely linked to each other. The founders of the COSp program illustrated this dynamic in an easy-to-understand way by depicting the child's attachment and exploration as a swing. When a child's need for exploration and learning is satisfied, their attachment behavioral system becomes activated. Conversely, when a child receives sufficient protection and comfort, their exploratory behavioral system is activated (Powell, Cooper, Hoffman, & Marvin, 2014).

Table 1: Structure of the Circle of Security-Parenting Program

Week No	Name of the Chapter	Description
Chapter one	Welcome to the Circle of Security Parenting	Introduction to attachment needs and the Circle of Security. Understanding that there is no perfect parenting and that it's never too late.
Chapter two	Exploring Our Children's Needs All the Way Around the Circle	Understanding how children need parents as a secure base and a safe haven to return to in times of need (as described in the children's needs map).
Chapter three	'Being with' on the Circle	Supporting emotional regulation. Learning to be present with children's emotions instead of fixing or dismissing them.
Chapter four	Being with Infants on the Circle	Attachment needs and the emotional regulation aspect of infants and babies.
Chapter five	The Path to Security	Identifying parents' triggers (shark music) and how shark music shapes their reaction to children's needs.
Chapter six	Exploring Our Struggles	Recognising how parents may miss or misinterpret their children's needs can establish a trustworthy relationship.
Chapter seven	Rupture and Repair in Relationships	There is no perfect relationship; learning how to reconnect after moments of disconnection.
Chapter eight	Summary and Celebration	Reviewing and discussing key concepts of the program.

Note. Structure of the Circle of Security parenting program information from the COSp facilitator's instruction.

Methodology

Participants were recruited through convenience sampling, using announcements distributed via the Nalaikh Family Development Center and private sector parenting networks. While convenience sampling may limit generalizability, it provided initial access to a motivated population interested in improving parenting practices. Initially, 68 parents expressed interest in participating through an online application. Of these, 33 were selected according to the following criteria: willingness and possibility to participate in the program and change parenting approach and having children between 0 and 5 years of age.

Initially, 68 parents expressed interest in participating through an online application. Of these, 33 were selected according to the following criteria:

- Willingness to participate in the program and change parenting approach.
- Children between 0 and 5 years of age.

The program consists of video lessons, psychological assessments, Q&A sessions, and group counseling. It meets once a week for 2 hours and lasts 8 weeks. The effectiveness of the program was measured using the following methodology.

1. *Parent Stress Index (Short Form).* The Parent Stress Index (PSI) was used to collect pre- and post-program assessments to measure the program's results. The Parenting Stress Index-Short Form (PSI-SF), developed by (Albidin, 1995), is a 36-item self-assessment tool specifically designed for parents of children up to 12 years old. It consists of three subscales, each containing 12 items measuring parenting stress, parent-child relationship, and child behavior.

This assessment method is based on a five-point scale combined with three subscales:

1. Parental Distress (PD) – Reflects parents' stress while nurturing their children.
2. Parent-Child Dysfunctional Interaction (P-CDI) – Assess problems in the parent-child interaction.
3. Difficult Child (DC) – Assesses the behavioral problems displayed by the child.

This assessment tool had been previously translated and tested, and its reliability was verified in Mongolia by researcher T. Bulganzaya in her 2022 study (Bulganzaya, 2022).

Table 2: Reliability Results of the Parenting Stress Index

Cronbach's Alpha	***N of Items***
.943	*36*

The internal consistency reliability of the Parenting Stress Index was evaluated using Cronbach's Alpha with a sample size of 108 participants. PSI demonstrated excellent internal consistency (α= .943)

COSp Questionnaire. A 9-question self-assessment survey titled "COSp Participant Survey" was administered, using a 5-point scale that ranged from "strongly disagree" to "strongly agree."

Two of these questions assessed learning from the program facilitator and other participants. The remaining seven questions assessed aspects such as stress, positive parent-child interaction, anxiety, meeting children's needs, withdrawing from the circle, responding to

children's behavior, and parental confidence in child-rearing. These were assessed both before and after the program.

2. *Questions Used for Exploring Parent Experiences in the COSp Program.* At the last session of the program, participants were also asked to respond to their experiences, perceived changes, understanding of the content, and unique aspects of the program in writing to the following four questions:

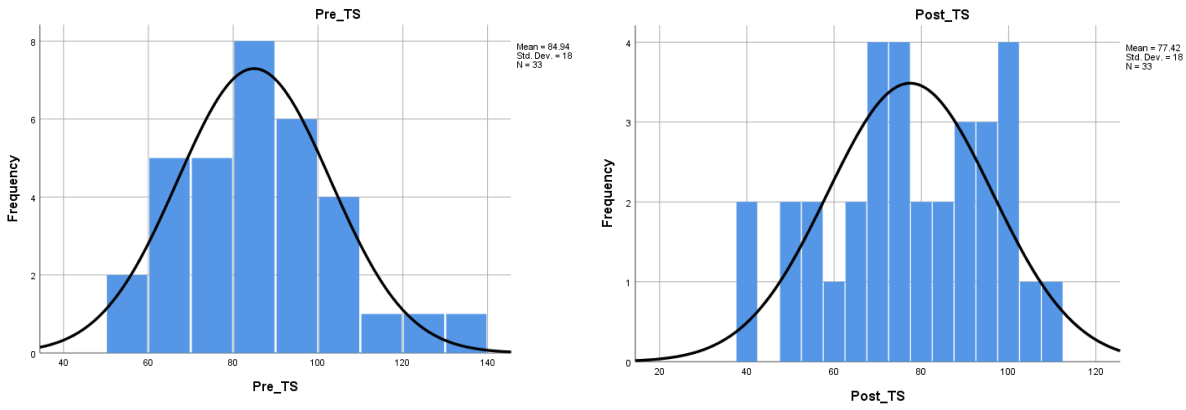
1. Would you like to share your experiences or provide feedback about the Circle of Security Parenting program?
2. Has there been any real-life change in your daily life?
3. Were there any aspects of the program that were difficult to understand?
4. What was unique about the training?

To analyze parents' responses, qualitative content analysis with an inductive approach was used. Responses were manually coded and grouped into key themes, including emotional insight, parenting changes, challenges, and unique aspects of the program. This method helped interpret participants' experiences and perceived outcomes of the COS-P program.

Results

The study included 33 parents (32 mothers and one father) between the ages of 26 and 42 (M=35) in two experimental groups (n=17) and one control group (n=16) using a convenient sampling method through the private sector, and Centre for Child and Family Development and Protection in Nalaikh District, 17 parents, from Ulaanbaatar. These parents had 77 children, ranging in age from 1 to 17.

Figure 2. Histogram Distribution of Parenting Stress Index (PSI) Pre- and Post-test Scores



Note: The histograms show normal distributions of PSI scores pre- (M=84.94, SD=18.05) and post-(M=77.42, SD=18.88) COSp program (N = 33).

Kolmogorov-Smirnov (KS) tests suggested that the Parenting Stress Index (PSI) scores were normally distributed across all groups for both pre-program (p=.200) and post-program (p=.200) assessments.

Table 3: Pre- and Post-Program Results of Parenting Stress Index for Experimental and Control Groups (Paired Samples t-test)

Group	Scale	Z	Asymp. Sig. (2-tailed)

Control Group (n=16)	Post_Parent Distress Pre_ Parent Distress	-.473[b]	.636
	Post_Parent-Child Dysfunctional Interaction Pre_ Parent-Child Dysfunctional Interaction	-.285[c]	.776
	Post_Difficult Child Pre_Difficult Child	-1.946[c]	.052
	Post_Total Score Pre_Total Score	-1.915[c]	.055
Experimental Group (n=17)	Post_Parent Distress Pre_ Parent Distress	-2.907[b]	**.004**
	Post_Parent-Child Dysfunctional Interaction Pre_ Parent-Child Dysfunctional Interaction	-3.261[b]	**.001**
	Post_Difficult Child Pre_Difficult Child	-2.588[b]	**.010**
	Post_Total Score Pre_Total Score	-3.221[b]	**.001**

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks.
c. Based on negative ranks.

Paired sample t-test analysis indicated that the experimental group exhibited significant reductions in all subscale scores and the total score after the program ($p < .05$). Conversely, no significant differences were observed in the control group's PSI scores and its subscales ($p > .05$), suggesting that parenting stress levels remained stable.

Table 4:Independent sample T test: Mann-Whitney-U

	Pre_TS	**Post_TS**
Mann-Whitney U	133.500	63.500
Wilcoxon W	269.500	216.500
Z	-.090	-2.612
Asymp. Sig. (2-tailed)	.928	.009

a. Grouping Variable: Group

The independent samples t-test results showed that there was no statistically significant difference in the Parent Stress Index (PSI) pre-test scores between the experimental and control group ($p>.05$). In contrast, in the post-test results a statistically significant difference between the control and experimental groups ($p<.05$), indicating that participation in the program significantly reduced parenting stress in the experimental group compared to the control group.

COSp questionnaire: A survey, known as the COSp participant survey, was conducted on the final day of the program with 17 parents from the experimental group. Two questions in the survey focused on the participants' self-evaluation of what they learned from the program facilitator and other participants. Additional questions utilized five measurement scales to assess various factors, including parenting-related stress, positive parent-child relationships, and positive parent-child interactions, both before and after the program.

Table 6: Statistical Indicators of the COSp Program Participant Survey

No	Question	Pre COSp Mean	Post COSp Mean	Z	Asymp. Sig. (2-tailed)
3	*Stress related to parenting*	3.41±0.87	2±0.71	-3.619[b]	.000
4	*Positive parent-child relationship*	3±0.79	4.12±0.86	-3.214	.001
Positive parent-child interaction (Prokasky, 2023)					
5. I recognize the behaviors that trigger my negative response to my child (i.e. my "shark music.")		1.71±0.85	3.82±0.88	-3.328[c]	.001
6. I identify and respond to my child's needs for support to explore and for comfort and contact (the top and the bottom of the Circle).		1.65±0.7	4.12±0.69	-3.727[c]	.000
7. When I fail to respond to my child's need (I step off the Circle), I look for a way to repair our relationship.		1.94±0.75	3.71±1.04	-3.515[c]	.000
8. I step back and think about what my child's behavior is telling me about his/her needs before I react. (the Circle and Hands)		1.59±0.62	4.18±0.64	-3.680[c]	.000
9. I feel confident that I can meet the needs of my child (ren).		2.35±0.7	4.47±0.72	-3.697[c]	.000

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks.
c. Based on negative ranks.

Questions 5 to 9 were measured Positive Parent-Child Interaction. The study The Wilcoxon signed-rank test results indicated ($p<.01$) statistically significant improvements in Parenting stress levels, Parent-child relationships, and Parent-child interactions.

COSp questionnaire were based on constructs from the program's theoretical model. Future studies should examine its psychometric properties (e.g., factor structure, reliability) in the Mongolian context.

Questions Analysis Used for Exploring Parent Experiences in the COSp Program

Exploring participants' experiences was conducted by analyzing their responses to open-ended questions to assess changes in participants' attitudes and understanding based on the study's results. The content analysis revealed positive changes in participants' understanding of child interaction, emotional awareness, parenting skills, and attitudes toward parental roles and responsibilities. These changes demonstrate the positive impact of the program. As observed in the study, the changes in participants' perceptions were summarized based on their responses to open-ended questions.

1. **Would you like to share your experiences or provide feedback about the Circle of Security Parenting program?**

The communication and understanding in child interactions have improved. Most participants reported that their skills in understanding and listening to children's emotions and needs and naming, identifying, and accepting children's feelings have improved. For example, in the response of a participant No 12: *"As parents, we did not understand ourselves, and we ended up fostering bad habits in our children. The most important thing is to change ourselves. I did not know what my son needed or what to do before, but now I know better."*.

Personal emotional growth and change: Participants reported that they could better recognize, understand, and manage their feelings. They started noticing the internal working model,

considering past experiences, grievances, worries, and fears as part of being humane; understanding where they were coming from and ultimately learning about themselves and their children. One example is a response from participant 1*: "I realized that I was paying too much attention to my 2-year-old son. As a result, I had been suppressing his expressive emotions due to his excessive movements. I have come to understand that the essence of life and child development lies in healthy relationships, and I now acknowledge my past mistakes. My husband and I have learned to communicate with our son and be present in his emotions."*

Perception of the necessity and importance of the COS-P program: Most participants expressed that it is necessary for all families in Mongolia and beneficial and applicable to real-life situations. For example, a participant 17 stated: *"I hope this program will successfully reach and be implemented for many families and children in Mongolia."*

"Has there been any real-life change in your daily life?

Positive relationship with their child. They developed an approach of viewing situations from the child's perspective, respecting their emotions, and communicating calmly, leading to more open and positive interactions with their children. For example, a participant 3 shared that their communication with their teenage daughter had improved: *"I am now able to understand and talk with my eldest daughter. We have started communicating openly."*

Positive changes in family atmosphere: Improved positive family interactions, fewer conflicts, and better problem-solving together based on mutual understanding were reported repeatedly. Parents also reported feeling closer to their children, developing better emotional insight into their children's feelings, and enhancing their communication. For instance, participant 17 stated that, *"Family conflicts have significantly reduced. Now we are talking and working things out. I learned that being strong and wise goes a long way."*

Were there any aspects of the program that were difficult to understand?

Most participants evaluated the training content as straightforward, practical, and closely connected to real life, making it easy to apply. While there were very few difficulties in understanding the content, some participants mentioned facing challenges in the following areas:

- It was sometimes difficult for them to recognize and understand their own feelings and to sense and identify their children's emotions for participant number 3.
- Participant number 11 found it challenging to apply the concept related to "stronger and wiser" in real-life situations.
- Number 16 participant expressed regret that he/she could not attend all training program sessions**.**

What was unique about the training?

Based on the participants' answers, the unique feature of this program was that it differed from traditional lecture-style and was instead more participatory and closely connected to real-life experiences. The key characteristics of the training can be summarized as follows:

Open and Positive Atmosphere. Participants highly valued the comfortable and emotionally open learning environment. The space allowed people to freely express their thoughts, actively listen to others, and share their experiences, all of which contributed to enhancing the overall effectiveness of the training.

Opportunity for Mutual Learning. One of the training's distinctive features was the opportunity for group members to engage in interactive discussions and exchange experiences. This approach enabled participants to learn from the facilitator, the training content, and from each other through mutual understanding.

Practical and Applicable to Daily Life. Participants noted that the knowledge and skills acquired during the training, particularly in the areas of parenting and family communication, were directly applicable to their everyday lives. They began to practice new approaches to communicating with their children, understanding and respecting their feelings, and collaboratively solving problems, which significantly increased the value and impact of the training.

Opportunity for Self-Reflection and Understanding Others. Participants found the training particularly unique in that it focused on developing the ability to understand oneself, reflect on past experiences, recognize and share emotions, and approach others' feelings with respect. This aspect was significant and valuable for many of the participants.

4. Discussion

The findings of this study suggest that the Circle of Security Parenting (COSp) program, grounded in attachment theory, has positively impacted Mongolian parents' understanding and approach to parenting.

Specifically, parents who participated in the program reported reduced stress levels, improved parent-child relationships, and more constructive responses to their children's challenging behaviors evaluated by their parents. Before participating in the program, most parents lacked knowledge and skills in recognizing and responding appropriately to their children's attachment needs. Many of them described themselves as either harsh or passive parents. However, after completing the program, they reported significant changes in their ability to:

- Understanding their children's emotional and attachment needs
- Building trust and strengthening parent-child relationships
- Identifying the underlying needs behind their children’s actions or behavior

These findings are consistent with the positive effects of the COSp program reported in previous studies conducted in other countries (Prokasky, 2023) (Gerdts-Andresen, 2021) (Pazzagli, Laghezza, Manaresi, Mazzeschi, & Powell, 2014) .

From now on, some challenges have emerged in the Mongolian context. There was a clear need to implement evaluation methodologies to assess Mongolian parents, such as caregivers' reflective functioning, emotional regulation, caregiver emotional availability, adult attachment classification, and caregivers with their children utilizing methods like the Attachment Patterns Classification (Strange Situation Procedure).

5. Conclusion

Based on the study's results, it was found that the stress levels of parents who participated in the program decreased, and parent-child relationships and interactions improved. There was a positive effect on children’s challenging behaviors as assessed by the parents. Therefore, it can be concluded that the "Circle of Security-Parenting" program is feasible for implementation among Mongolian parents. This outcome suggests the potential for

implementing related programs, such as the "COS classroom" for teachers and educators and the "COS intensive" for psychologists and clinical therapists in Mongolia.

The widespread implementation of the Circle of Security Parenting program could significantly improve children's mental health and strengthen parent-child relationships in Mongolia. Parenting programs such as these could be implemented widely and embedded into the community so that the next generation will be more emotionally aware and resilient in managing their numerous challenges**.**

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Comparison of Mongolia's Domestic and Foreign Policy: On the Example of the Decision-Making Process

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Abstract. There are similarities between the domestic and foreign policies of any country; however, there are also notable differences. The main difference is that domestic policy decisions are governed by domestic law, whereas foreign policy is implemented through both international and domestic law, and in some cases, occurs in an anarchic international environment. The comparison of domestic and foreign policies and the study of decision-making processes have many implications. For instance, in our country, the domestic policy decision-making process is more legally structured and organized than its foreign policy counterpart. For example, the rights, duties, and responsibilities of the parties involved in the decision-making process are clearer, the implementation of the decisions is monitored, analyzed, and evaluated, erroneous decisions are reversed, there are more available options, such as reviewing and, if necessary, reversing decisions. As for foreign policy, although the decision is made internally according to national laws and regulations, by government authorities and employees, it often depends on external factors. Furthermore, in practice, the foreign policy decision-making process—including its stages, mechanisms, and the limited participation of certain parties, lack of qualified human resources, lack of legal framework, and lack of monitoring and accountability mechanisms are influenced by internal factors thus, numerous factors influence internal policy decision-making and differs from foreign policy analysis in both process and scope.

Keywords: *International relations, internal factors, decision-making*

Introduction

In the era of globalization, the distinction between domestic and foreign policy is increasingly blurred. Domestic policy issues are becoming foreign policy issues.

Foreign policy issues are increasingly studied both domestically and internationally as a subject of political science and international relations. However, research from the perspectives of public administration and legal studies remains limited. To briefly review the international research on this topic, prominent international relations scholars Valerie M. Hudson and Christopher S. (surname needed), in their work, *Foreign Policy Analysis: Past, Present, and Future*, examine how foreign policy analysis has been conducted in different historical and temporal contexts, while Alden, Chris, and Amnon Aran have proposed a new approach to foreign policy analysis. Routledge and Vore, on the other hand, have focused on foreign policy analysis more from the perspective of mechanisms and structures. Joseph Nye, the founder of soft power theory, has considered soft power as a form of foreign policy and the impact of power on it.

However, Tumurchuluun G. was the first to study Western theories of foreign policy decision-making in our country and proposed the idea of introducing Western theoretical models of foreign policy decision-making in Mongolia. In addition, the majority of works by scholars in the fields of politics and international relations, including the improvement of Mongolia's foreign policy decision-making mechanism, comparative studies of foreign policy decision-making mechanisms in some foreign countries, and the influence of political parties on foreign

policy decision-making, are predominantly focused on these themes. The state of research on the topic, especially domestic publications, shows that there is little research comparing foreign policy decision-making, processes, mechanisms, and systems with domestic policy issues. This may be attributed to the prevailing perception that foreign policy issues fall primarily within the realm of political decision-making and international relations. Foreign policy is a form of state policy and a continuation of a state's domestic policy. Therefore, interdisciplinary research can be pursued at the intersection of multiple disciplines, including public administration, law, and journalism, in addition to the fields mentioned above. Studying from multiple scientific perspectives is of great importance in approaching the issue holistically, thereby improving the internal legal regulation of foreign policy decisions, and aligning decisions with the rights and legitimate interests of the state and its citizens.

In this article, the author uses research methodologies such as comparing Mongolia's domestic and foreign policy decision-making processes, case analysis, and evaluation to identify shortcomings and issues that need to be addressed in our foreign policy decision-making process.

There are many pressing issues in the foreign policy decision-making process in Mongolia. In particular, decision-makers often make erroneous and flawed decisions on many strategic important projects such as the Tavan tolgoi and Raiway projects in Mongolia.

While there is a practice in Mongolia of reviewing, correcting, monitoring, and controlling errors stemming from domestic policy decision-making, foreign policy decision-making is rarely monitored or corrected. Perhaps some lessons can be learned from the domestic policy decision-making process and applied to foreign policy decision-making.

This is because domestic and foreign policies are interconnected and interdependent—in other words, two sides of the same coin. Therefore, it is not denied that foreign policy decision-making can benefit from domestic policy decision-making.

I. Domestic and foreign policy of the state: comparison

Domestic and foreign policies share a primary objective: the development and progress of the country, and the protection of national interests. Foreign policy is a natural extension of domestic policy, as it aims to create a favorable external environment for national development and prosperity.

According to Mongolia’s Foreign Policy Concept (2011), the objectives of Mongolia’s foreign policy are:

1) To maintain friendly relations with countries around the world;

2) To develop cooperation in political, economic, and other fields;

3) To strengthen Mongolia’s position in the international community; and

4) To reinforce national independence and sovereignty through accelerated development.

Foreign policy has a significant impact on the survival and development of a nation and plays an important role in protecting national interests.

Domestic policy, on the other hand, is "the policies and activities carried out by the state to ensure the well-being of its citizens" (Teodoulou & Cahn, 1995). State policy encompasses all sectors of society, including finance, the economy, industry, health, agriculture, culture, and sports. Foreign policy is "a state strategy aimed at creating favorable external conditions for the implementation of domestic policy goals of a particular state" (Plano & Olton, 1996).
Mongolia's foreign policy consists of interrelated main components: politics, economics, science and technology, culture, humanitarian foreign policy, protection of the rights of citizens abroad, foreign propaganda, and public relations policy. The foreign policy of the country is a defining component of state policy.

1.1 Similarities between domestic and foreign policy

1. The primary goal is to safeguard national interests, including independence, sovereignty, and territorial integrity.
2. The legal basis is common. In other words, the legal basis is common.
3. Both policies are a sequential political process (information gathering, identification, analysis, decision-making, implementation, and evaluation of results)
4. The budget of the Ministry of Foreign Affairs, which implements foreign policy is approved by Parliament upon submission by the Government. In other words, the Parliament decides on the financing of foreign policy.
5. The human resources of the Ministry of Foreign Affairs, such as the number and location of diplomatic missions abroad, are determined by the Parliament and the Government.
6. Research, information, and analysis are important in both domestic and foreign policy.
7. Domestic and foreign policy decisions are made domestically.

Evaluating foreign policy is often challenging, as it is not solely determined by domestic conditions but is heavily influenced by the external international environment. All actors involved in these processes are Mongolian citizens who operate under the legal framework of the Republic of Mongolia (for example, officials elected under the Law on Civil Service and the Law on Diplomatic Service).

1.2 Differences between domestic and foreign policy

1. Foreign policy is primarily implemented in the international arena.

2. There are some challenges in the process of evaluating foreign policy.

These include:

- Foreign policy may be implemented through both short-term and long-term strategies.

- The outcome of foreign policy can be successful or unsuccessful. Foreign policy outcomes may vary in success and inherently carry risks.

Although foreign policy decisions are made domestically within the framework of state governance (by domestic laws such as the Constitution and foreign policy concepts), implementation takes place in the external environment within the framework of international legal principles and norms.

In Mongolia, the central institution responsible for the state's foreign policy is the Ministry of Foreign Affairs. The civil servants and diplomats working there are, as Mongolian citizens, The civil servants and diplomats working there are Mongolian citizens and belong to the special state service governed by national law. The Ministry of Foreign Affairs and diplomatic missions abroad operate by Mongolian law.

The current government policy on improving accountability and discipline in state institutions applies equally to the Ministry of Foreign Affairs (MOFA) and its system organizations. This shows that the state's foreign policy is a component of state policy. In addition to diplomatic activities, one of the issues that the Ministry of Foreign Affairs must include in its annual work plan is "domestic affairs". These include matters concerning the implementation of domestic legislation within the ministry, as well as broader state administrative functions.

It is no coincidence that in some countries, such as the Kingdom of Belgium, the central government (public) administrative body responsible for foreign relations is called the “Public Service of Foreign Affairs of the Kingdom of Belgium” (Service Public des Affaires Étrangères). This is an indication that foreign relations and diplomatic service are a matter of public administration.

II. Mongolia's Domestic and Foreign Policy Decision-Making Process

The foreign policy decision-making process comprises several stages. These stages include collecting information, analyzing it, drawing conclusions, developing and submitting a draft to the highest authority, and ultimately making a final decision. This process concludes with the implementation of decisions in the external environment, including bilateral, regional, and global contexts.

The process of making foreign policy decisions is a political process. Any foreign policy issue within a hierarchical governance system is resolved according to public administration laws and regulations. This feature is grounded in domestic legislation, but decisions made domestically are implemented in the external environment, through notes, statements, declarations, and agreements.

During the socialist era, foreign policy decisions were made by the Central Committee and Politburo of the Mongolian People's Revolutionary Party. This situation changed dramatically with the adoption of the new Constitution in 1992.

The distribution of powers in Mongolia's foreign relations is regulated by several laws, including the Constitution of Mongolia, the Law on the Parliament and Government, and the Law on Diplomatic Service. For example, the State Great Khural:

According to the Constitution of Mongolia, **the State Great Khural** (parliament) determines the foreign and domestic policies of Mongolia. In this sense, within the scope of its authority, the Parliament adopted the National Security and Foreign Policy Concepts of Mongolia in 1994. Subsequently, both concepts were revised in 2010 and 2011.

The Standing Committee on Security and Foreign Policy of the Parliament has been designated to be responsible for the following issues: Mongolia's national security, defense, armed forces, preservation and protection of state secrets, Mongolia's borders and their protection, foreign policy, These responsibilities include the appointment of heads of plenipotentiary missions to other countries and international organizations, international treaties of Mongolia, and Mongolia's accession to international organizations.

According to the Constitution, the President of Mongolia is vested with the authority to ensure national security by chairing the National Security Council of Mongolia, which is composed of the President, the Prime Minister, and the Speaker of the Great Khural. The President obtains information related to ensuring national security from appropriate organizations and initiates necessary issues at the meetings of the National Security Council, assigning duties and tasks to relevant organizations and officials, monitoring the implementation of the NSC's

recommendations, and, if deemed necessary in the interests of ensuring national security, reviewing and obtaining information on specific activities of state security organizations.

The President's powers in foreign relations include fully representing Mongolia in foreign relations, making statements and negotiations, concluding international agreements on behalf of Mongolia in consultation with the State Great Khural in accordance with the law, visiting foreign countries and reporting to the State Great Khural on the results of the visit, The head of a plenipotentiary mission abroad is appointed or recalled in consultation with the State Great Khural in accordance with the legislation, and if the candidate proposed for appointment as the head of a plenipotentiary representative office of Mongolia abroad fails to receive the support of the majority of all members present at the meeting, the President shall submit another proposal,

The National Security Council is responsible for its work before the Parliament, as stipulated in the Law on the National Security Council of Mongolia. The duties of the National Security Council include determining the direction to be followed during high-level negotiations with foreign countries and international organizations, expressing the position of the state and government on certain issues at high-level meetings with foreign countries and international organizations, and consulting with them in accordance with the state's foreign policy, This includes analyzing the state and social life of the country, developing proposals for necessary measures to be taken, and submitting them to the Council for discussion in order to ensure national security and the unity of the state's foreign and domestic policies.

The Government shall implement the state's foreign policy. The Ministry of Foreign Affairs, which is part of the Government, shall, in accordance with the Law on Diplomatic Service, be the central state administrative body in charge of foreign affairs and shall carry out the following functions: These include ensuring Mongolia's independence, state sovereignty, and territorial integrity in accordance with the universal principles of international relations and in terms of law, creating a favorable external environment to ensure national security and national development, and strengthening and protecting Mongolia's national interests, position, and reputation internationally through diplomatic means, To implement diplomatic and consular relations established by Mongolia with foreign countries, to ensure the active representation of the country in international organizations to which Mongolia has joined, to protect its interests, to develop, approve, and implement proposals on the foreign policy of the Mongolian state, its concepts, and priorities, and to summarize the progress and results, Organizing the implementation of Mongolia's unified and consistent foreign policy; expressing the official position of the Mongolian state and government, and to coordinate foreign policy and activities with economic, scientific, technical, trade, and humanitarian cooperation, To provide information, research, and methodological recommendations for international relations activities implemented by state and government organizations, to coordinate them at the national level, to guide the activities of diplomatic missions operating abroad, and to determine their location, To develop proposals to improve the organization in accordance with current requirements, to provide Mongolia with unified methods and professional recommendations for activities related to the conclusion and compliance with international treaties, and to summarize the overall status of the fulfillment of the obligations assumed by the Mongolian side in accordance with them, It includes reporting to the Government on the implementation process, maintaining the Mongolian foreign affairs archive, preserving Mongolia's international treaties, promoting Mongolia abroad, disseminating official information, providing the Mongolian public with up-to-date information on diplomatic activities and international affairs, and organizing and conducting state diplomatic ceremonies.

The process of domestic policy decision-making. Figure 1

Just as a feasibility study or architectural design is essential for constructing a school or factory, research, information, and analysis are indispensable for formulating foreign policy.

Conducting research and gathering information are fundamental functions of diplomats. The 1961 Vienna Convention on Diplomatic Relations affirms that research and information-gathering constitute one of the primary responsibilities of diplomatic missions.

Information and the research derived from it are the essential raw materials for policy- and decision-making. In essence, the primary function of research is to provide a foundation for informed decision-making. Sound decisions cannot be made without relevant research and well-founded conclusions.

The foreign policy decision-making process. Figure 2.

1. Information Gathering/Data collection: Collect accurate data from credible sources such as international news agencies, specialized services, and intelligence organizations.

2. Transfer information/Information Communication: Ensure that collected data reaches decision-makers efficiently while minimizing risks of miscommunication due to cultural differences, translation errors, or ambiguity.

3. Analysis: A responsible decision-maker evaluates the collected data, considers both external and internal conditions, examines potential consequences, and formulates multiple policy options.

4. Decision-Making: Select the most appropriate option based on alignment with national interests and awareness of psychological and strategic factors.

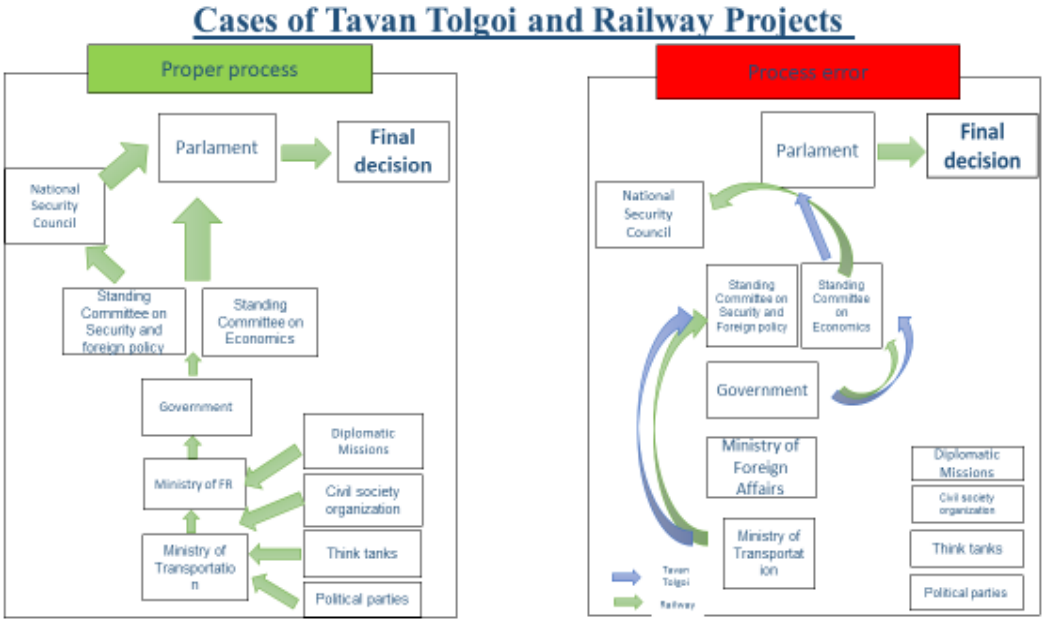
Foreign policy is executed through diplomacy, which is considered both a science and an art. Diplomacies—whether American, Russian, Chinese, or Mongolian—are rooted in systematic research and empirical evidence.

Perhaps the most important similarity between domestic and foreign policy is that both are rooted in the pursuit of national interests. As Hans Morgenthau famously stated, “American foreign policy has only one god, and that is the American national interest.” This means that the decision will be prioritized to see how it will affect national interests. The concept of national interests includes issues related to the existence of a country, such as its independence and sovereignty.

Great powers may be blinded by their own strengths—economic, technological, or military—while smaller states, lacking such capabilities, must rely on rigorous intellectual analysis. As one prominent scholar of international relations noted, “The ability to analyze any event, to see the world as a unified whole, to carefully weigh time, space, and ideas, and to synthesize knowledge into a coherent whole is the most valuable quality of a politician.”

Notable cases where the foreign policy decision-making process deviated from established procedures include the Tavan Tolgoi and Railway projects. The picture below shows many process errors. The first picture of Figure 3 shows the correctness of the decision-making process while the second one shows the errors in the decision-making process in the Tavan Tolgoi and Railway projects. As shown in Figure 3, no initial input was received from civil

society organizations, political parties, research institutions, or embassies. The decision-making process was initiated directly by the Ministry of Transport. Figure 3 illustrates that the decision-making process was fundamentally flawed. Mongolia adheres to the bureaucratic theory of foreign policy decision-making, as evidenced by its official policy documents and legal frameworks. This is confirmed by our country's policy documents and other related laws. A key feature of bureaucratic theory is its bottom-up structure; however, this procedural direction was not observed in either project.



Tavan Tolgoi, Railway Policy Development Process. Figure 3

In conclusion, domestic and foreign policy represent two sides of the same coin, both aimed at promoting national development and safeguarding vital interests. Foreign policy functions as a natural extension of domestic policy, seeking to establish a favorable external environment that supports internal prosperity.

Despite these parallels, significant distinctions exist. While domestic policy operates under national legislation, foreign policy is shaped and implemented through international legal frameworks. Foundational documents such as the United Nations Charter and the Vienna Conventions on Diplomatic and Consular Relations (1961 and 1963) govern international diplomatic conduct. Mongolia's Constitution affirms that ratified international treaties have the same legal standing as domestic laws.

However, the foreign policy decision-making process in Mongolia does not consistently adhere to due process, particularly in the context of strategically important projects. Domestic and foreign policy procedures often diverge, even though they form part of a unified national policy. Ideally, the procedural frameworks guiding both domains should be integrated to ensure consistency, legitimacy, and accountability.

Unlike domestic policy, the foreign policy process in Mongolia often lacks practical implementation of decision-making steps, along with sufficient mechanisms for review, oversight, and accountability. This may be attributed to the absence of comprehensive sector-specific legislation. The case study discussed in this paper highlights the urgent need to strengthen the legal framework governing Mongolia's foreign policy decision-making.

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Student perception and use of Artificial Intelligence in Academic Essay

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Abstract. The study aims to examine the perception and use of Artificial Intelligence (AI) among university students in Mongolia. With the rapid development of AI, it brings both positive and negative impacts on education. The latest advancements in AI are reshaping the way students learn and study, bringing both benefits and challenges associated with the use of AI. Therefore, it is necessary to investigate the transformative nature of the AI which could have both positive and potentially negative impact on the learners` perception. Many foreign researchers have conducted studies with regard to the use of AI in education, yet no in-depth studies on use of AI in education have been done yet in Mongolia. The study involves undergraduate university students taking IELTS course which requires students to write academic essays. The data collected via Google forms have been analyzed using Excel and SPPS. We have conducted this study to determine whether there is correlation between the use of AI-generated essay outlines prior to essay writing and the improved coherence and clarity of their essay writing after using AI essay generators. Hence, it can be concluded from the correlation analysis that the AI-generated essay outlines enable students to enhance the clarity and coherence of their essays.

Keywords: *technology in language learning, technology in academic writing, Artificial Intelligence in learning*

Introduction

With the advancement in technology, AI tools are being widely deployed in the education system, opening up great opportunities to enhance and expand learning. We must acknowledge that AI has become an integral part of today`s education system as high school as well as university students are using AI on a daily basis to check grammar, review an essay and summarize texts. Since AI continues to breakneck pace, it is vital to explore its implications affecting education.

According to study conducted by Union Bank of Switzerland, Chat GPT has become the fastest-growing user application reaching 100 million active users just two months after its release. (Hu, 2023) Chat GPT was developed by OpenAI, an American artificial research organization founded by Elon Musk in 2015, and was designed to generate human-like text based on given prompt or conversation on wide range of topics. (Zhai, 2022) ChatGPT mainly aims to interact through conversations that involve a set of questions from people using it and responses from the application. Unlike the search engines, ChatGPT simulates follow-up questions by sustained dialogue that creates various experiences for the users. (Pericles 'asher' Rospigliosi, 2023) It has been thought that asking questions is a form of interactive learning. (Pericles 'asher' Rospigliosi, 2023) Thus, it is important for learners to be able to ask the

questions to get better responses and results from ChatGPT. This kind of interaction encourages learners to use ChatGPT for learning through asking questions and considering the answers that are at the centre of interactive learning. (Pericles 'asher' Rospigliosi, 2023) ChatGPT is designed as chatbot which means that the quality of the system responses is dependent on the kinds of the questions asked. (Stojanov, Liu, & Koh, 2024) ChatGPT model has been trained on a diverse range of text-based inputs, articles and websites which enables it to understand user input, generate responses and maintain coherent conversations on a wide range of topics. (Chan & Hu, Students` voices on generative AI: perceptions, benefits, and challenges in higher education, 2023) ChatGPT can write essay, brainstorming research ideas and perform other tasks based on the prompts provided by the learners. On the other hand, teachers can use ChatGPT for lesson plans, student assessment and professional development. (Shoufan, 2023)

Artificial Intelligence-enabled language models such as ChatGPT have been revolutionizing all sectors including the education. Although ChatGPT and other artificial intelligence-enabled technologies can have benefits and solutions, they are considered to be a threat to the integrity and purposes. (Farhi, Jeljeli, Aburezeq, Dweikat, & Al-shami, 2023) Features, abilities, and challenges of ChatGPT have been studied which concluded that it can offer solutions from the most important to minor issues. (Haleem, Javaid, & Singh, 2023) Mhalnga studied the implications of ChatGPT in the field of education by reviewing 8 articles. (Mhlanga, 2023)

The study has the following objectives:

- examine the students` knowledge and perspective of AI in Academic Essay writing
- identify the frequency and extent to which the students use artificial intelligence
- look at the impact of AI in writing academic essays
- the students` perspectives on how AI should collaborate with human writers in the future
- whether the use of AI can have positive impact on their writing skills

The study has the following research questions:

- Does use of AI have positive impact on students` writing skills?
- Does use of AI-based plagiarism detection technologies enhance their general writing ability?
- What are students` perspectives on how AI should collaborate with human writers in the future?

Literature review

AI-driven writing tools drew attention for their ability to help students in composing essay, offering grammar and style suggestions and facilitating content generation. (Gayed, Carlton, Oriola, & Cross, 2022) The tools were proved to be valuable learning aids. Previous study was conducted to investigate the use of AI in academic essays using case study design. (Malik, et al., 2023) Findings of the research indicated positive reception of AI-powered writing tools, with students recognizing their advantages in grammar checks, plagiarism detection, language translation and essay outlines. Nevertheless, some students have expressed concerns regarding potential impact on creativity, critical thinking and ethical writing practices. (Malik, et al., 2023) Researchers pointed out that it was necessary to improve the AI tools to enhance the contextual understanding and effectiveness across various subject areas. Using AI in academic essay writing also raises the issues about the educators` roles and ethical considerations. (Makarius, Mukherjee, Fox, & Fox, 2020)

There has been emphasis on the increasing use of AI-driven technologies in education, in particular ChatGPT. Along with providing comprehensive definition of the ChatGPT, researchers examined the potential benefits, limitations, challenges posed by ChatGPT. (Su & Yang, 2023) The article also proposed a theoretical framework for using ChatGPT in education which will be used in our study. Researchers previously reviewed 63 publications on ChatGPT and coded and summarized the methods, reported potentials, limitations and future of each study. (Memarian & Doleck, 2023) Researchers also have employed exploratory methodology to understand the potential advantage of ChatGPT in Education. (Baidoo-Anu & Ansah, 2023) The research also looked at how interactive ChatGPT is, possible benefits and drawbacks of ChatGPT.

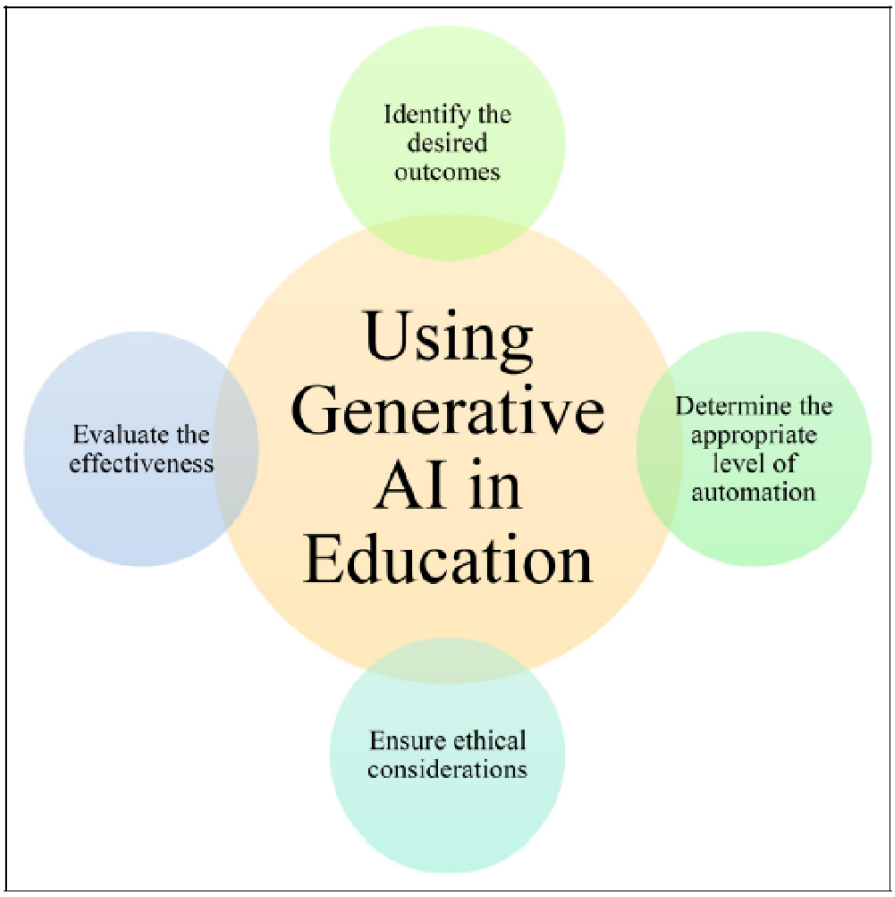
The research contributes to the literature which focuses on the perception, frequency and extent to which students use AI, impact of AI and students` perspectives on how AI should collaborate with human writers in the future as there are no current studies on the AI in Education in Mongolia. In order to understand the role of AI in teaching and learning, it is important to examine the learners or students` perception of the topic. Frequency and the extent to which the students use AI in their learning is an important for the research.

Theoretical framework

When using ChatGPT and other generative AI in education, the following theoretical framework can be applied as a guide. (Su & Yang, 2023)

1. Identify the Desired Outcomes: It is crucial to identify the objectives of the application before using ChatGPT or other generative AI in education or educative AI.
2. Determine the appropriate level of automation: Depending on the objectives, it could be suitable to fully automate the teaching or learning experience using generative AI in education or use it as a supplement to traditional teaching methods.
3. Ensure Ethical Considerations: Ethical underpinnings of using educative AI must be carefully considered, which include potential biases and their impact on teachers and students.
4. Evaluate the effectiveness: It is important to evaluate the effectiveness of educative AI in achieving the desired outcomes.

Figure 1. Theoretical framework for using AI in education



Methodology

The questionnaire with 45 questions was administered to 41 undergraduate students taking IELTS course at the University of the Humanities using Google Forms. Of the respondents, there were 4 junior students and 36 senior students majoring in International Relations, Psychology, Translation, Teaching, Business administration and Tourism Management. Of total respondents, 15 students were and 26 female students took part in the research.

The questionnaire had sets of questions covering knowledge of AI in academic essay writing, the frequency and extent to which students use artificial intelligence, the impact of AI in writing academic essays and students` perspectives on how AI should collaborate with human writers in the future. At the end of the questionnaire, the participants responded open-ended question about the difficulties or challenges they faced when using AI such as Chat GPT.

We have used Excel and SPSS to analyze the data and make statistical analysis. The students` responses were downloaded as Excel file which was used to make visual prompts such as bar charts and bar graph. After that, the data have been imported and edited in SPPS for further statistical analysis. The most of the items on the questionnaire required the students to indicate their level of agreement through given statements using 5-point Likert Scale.

Results

The questionnaire enabled us to examine the students` knowledge of AI and the frequency and extent to which the students use artificial intelligence in their learning. Internal consistency reliability was measured using Cronbach`s Alpha. Tables 1-4 demonstrate the SPSS analysis statistics on identifying reliability of the sets of the questions. The statistics in the following

tables shows that Cronbach Alpha is between 865 and 968. Therefore, it can be concluded that there is internal consistency between the items.

Table 1. The knowledge of AI in Academic Essay writing

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.864	.865	9

Table 2. The impact of AI in Academic Essays

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.950	.951	9

Table 3. Students` perspectives on how AI should collaborate with human writers in the future

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.968	.968	10

Table 4. The frequency and extent to which students use artificial intelligence

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.927	.928	9

Table 5. Knowledge of AI in Academic Essay Writing (N=41)

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I am aware that AI-powered writing tools for academic essays exist	41.5%	14.6%	39.0%	2.4%	2.4%
In my essay writing, I employed AI-powered grammar and spelling checkers.	7.3%	14.6%	43.9%	14.6%	19.5%
I am familiar with AI-based plagiarism detection techniques that I may use to ensure the originality of my academic work.	29.3%	2.4%	22.0%	36.6%	9.8%
I have utilized AI methods for content summaries to comprehend challenging research publications.	17.1%	17.1%	41.5%	7.3%	17.1%
I am familiar with AI-generated citation and reference tools that I use to prepare my academic work.	22.0%	22.0%	19.5%	22.0%	14.6%
I have made use of AI-driven language translation technologies to access academic information written in languages other than my own.	17.1%	12.2%	31.7%	22.0%	17.1%

I`m aware of AI-writing helpers that provide context-specific word and phrase suggestions to improve my essay writing.	14.6%	14.6%	34.1%	19.5%	17.1%
I`ve used AI-generated essay outlines to efficiently arrange my ideas before writing.	19.5%	19.5%	26.8%	17.1%	17.1%
I am confident in my knowledge of AI-powered writing tools for academic essay writing.	12.2%	24.4%	39.0%	14.6%	9.8%

It can be seen from the table that more than half of the students were aware that the AI-powered writing tools for academic essays exist. However, less than one third of the respondents replied that they do not employ AI-powered spelling grammar and checkers. The data demonstrate that 46% of the students are not familiar with the AI-based plagiarism detection techniques that they may use to ensure the originality of their academic work whereas a third of the students replied that they were familiar with the AI-based plagiarism detection techniques.

In addition, 43.7% of the students replied that they were familiar with AI-based plagiarism detection techniques that they may use to ensure the originality of their academic work whereas 36.6% of them said that they were not familiar with the techniques.

Table 6.The frequency and extent to which students use artificial intelligence (N=41)

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I examine and enhance my works using AI-powered grammar and spelling checkers	17.1%	19.5%	36.6%	12.2%	14.6%
I use AI-based plagiarism detection technologies to assure the originality of my academic writing.	4.9%	7.3%	43.9%	19.5%	24.4%
AI-generated content summaries assist me in understanding difficult research articles for inclusion in my writings.	12.2%	22.0%	36.6%	12.2%	17.1%
I utilize language translation AI to access academic literature written in languages other than my native language.	9.8%	17.1%	48.8%	9.8%	14.6%
AI-powered writing helpers provide context-specific word and phrase suggestions to help me improve my essay writing.	4.9%	22.0%	48.8%	12.2%	12.2%
AI-powered systems suggest research subjects and suitable sources to help me prepare my essay.	7.3%	19.5%	46.3%	12.2%	14.6%
Artificial Intelligence tools assist me in tailoring the styles and tone of my essays to certain academic criteria	12.2%	22.0%	43.9%	9.8%	12.2%
I utilize AI-generated essay outlines to successfully arrange my ideas before writing.	14.6%	17.1%	43.9%	7.3%	17.1%

AI-powered time management tools assist me in keeping track of my essay writing	14.6%	19.5%	41.5%	7.3%	17.1%

More than one third of the students responded that they examined and enhanced their works using AI-powered grammar and spelling checkers while more than one quarter of them replied that they did not use AI-powered grammar and spelling checkers.

34.1% of the students agreed that they AI-generated content summaries assist them in understanding difficult research articles for inclusion in their writings while one third of them did not use AI tools that generate content summaries.

A third of the respondents said that Artificial intelligence tools assisted them in tailoring the styles and tone of their essays to certain academic criteria; AI-generated essay outlines helped successfully arrange their ideas before writing and AI-powered time management tools assisted them in keeping track of their essay writing. One in five students responded that they did not use AI tools in their writing to the questions.

Table 7.The impact of AI in academic writing

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Using AI technologies in my essay writing has enhanced my general writing ability.	9.8%	29.3%	43.9%	7.3%	9.8%
AI-powered grammar and spelling checks have assisted me in identifying and correcting my writing errors, which has contributed to my writing ability growth.	12.2%	26.8%	41.5%	9.8%	9.8%
AI-based plagiarism detection systems have raised my understanding of academic integrity and the value of uniqueness in writing.	12.2%	14.6%	51.2%	12.2%	9.8%
AI-generated content summarizing has improved my capacity to extract essential ideas from difficult research articles, which has improved my writing comprehension.	7.3%	29.3%	46.3%	12.2%	4.9%
Using AI aids has increased the clarity and coherence of my works favorably improving my writing style.	9.8%	29.3%	43.9%	7.3%	9.8%
AI-generated essay outlines have helped me arrange my ideas more efficiently and enhance the organization of my work.	9.8%	31.7%	39.0%	9.8%	9.8%
The use of AI tools in my essay writing has forced me to critically assess and critique my own work, which has resulted in increased self-editing abilities.	14.6%	19.5%	19.5%	19.5%	7.3%
Artificial Intelligence-based language translation technologies have introduced me to a wide range of academic information, extending my viewpoint and writing repertoire.	9.8%	22.0%	48.8%	9.8%	9.8%
I feel that employing AI technologies has improved my writing abilities and greatly impacted my academic essay writing.	19.5%	29.3%	41.5%	4.9%	4.9%

39 percent of the students replied that using AI technologies in essay writing has enhanced their general writing ability and the same percentage of students said that AI-powered grammar and

spelling checks have assisted in identifying and correcting their writing errors, which has contributed to their writing ability growth.

Just over a third of the students responded that use of AI tools in their essay writing has forced them to critically assess and critique their own work, which has resulted in self-editing abilities whereas over a quarter of the respondents said that these AI tools did not help them improve their abilities.

41.5 percent of the students mentioned that AI-generated essay outlines have helped them arrange their ideas more efficiently and enhance the organization of their work while similar percentage of students said that they did not use AI-generated outlines.

Almost half of the students felt that employing AI technologies has improved their writing abilities and greatly impacted their essay writing.

Table 8.The impact of AI in academic writing

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I contend that AI should be employed as a writing helper to assist human authors during the essay writing process.	19.5%	29.3%	41.5%	4.9%	4.9%
AI should be used to discover probable grammatical and spelling problems, with human authors making the ultimate choice on fixes.	24.4%	19.5%	36.6%	12.2%	4.9%
I like AI to supply content recommendations and ideas, while human authors keep creative control over the essay`s direction and reasoning.	22.0%	26.8%	39.0%	7.3%	4.9%
AI should suggest human authors by suggesting research topics and suitable topics, but human writers should still undertake critical analysis and synthesis.	19.5%	31.7%	31.7%	12.2%	4.9%
I contend that AI-generated outlines can be useful, but human authors should be free to adapt and expand on them to fit their writing style.	26.8%	31.7%	26.8%	9.8%	4.9%
Artificial Intelligence should be employed for content summarizing and synthesis, supporting human authors in reducing complicated material into brief and comprehensible paragraphs.	19.5%	24.4%	41.5%	7.3%	7.3%
I involving artificial intelligence to assist in correct citation and referencing, but human authors must guarantee authenticity and appropriateness of the sources mentioned	31.7%	17.1%	29.3%	17.1%	4.9%
While AI may assist with language translation, human authors should verify the translated content to guarantee context and correctness.	31.7%	17.1%	31.7%	12.2%	7.3%
AI should be used to discover possible areas for improvement during the editing process, while human authors give the final tweaks and improvements.	36.6%	19.5%	29.3%	9.8%	4.9%
I believe that AI and human authors should work in tandem to maximize AI efficiency while keeping human originality and critical thinking in essay writing.	29.3%	14.6%	41.5%	7.3%	7.3%

In can be concluded from the above table that almost half of the students who responded the questionnaire said that AI should be employed as a writing helper to assist human authors during the essay writing process; that they like AI to supply content and recommendation ideas while human authors keep creative control over the essay`s direction and reasoning; that involving AI to assist in correct citation and referencing, but human authors must guarantee authenticity and appropriateness of the sources mentioned. 48.8% of the students responded that while AI may assist with language translation, human authors should verify the translated content to guarantee context and correctness.

Another interesting findings of the research were that more than half of the respondents replied that AI should suggest human authors by suggesting research topics and suitable topics, but human writers should still take critical analysis and synthesis. 56% of the students believed that AI should be used to discover possible areas for improvement during editing process while human authors give final tweaks and improvements.

58.5% of the respondents contended that AI-generated outlines can be useful, but human authors should be free to adapt and expand on them to fit their writing styles. Only minority or 14.6% of the students did not agree with this.

Table 9. Correlations

			I use AI-based plagiarism detection technologies to assure the originality of my academic writing.	Using AI technologies in my essay writing has enhanced my general writing ability.
Spearman's rho	I use AI-based plagiarism detection technologies to assure the originality of my academic writing.	Correlation Coefficient	1.000	.305
		Sig. (2-tailed)	.	.053
		N	41	41
	Using AI technologies in my essay writing has enhanced my general writing ability.	Correlation Coefficient	.305	1.000
		Sig. (2-tailed)	.053	.
		N	41	41

The statistical analysis Spearman`s rho is weakly correlated which demonstrates that as the learners use AI-based plagiarism detection technologies, this can enhance their general writing ability. However, the Sig value is .053 which is statistically insignificant. (Table 9)

Table 10. Correlations

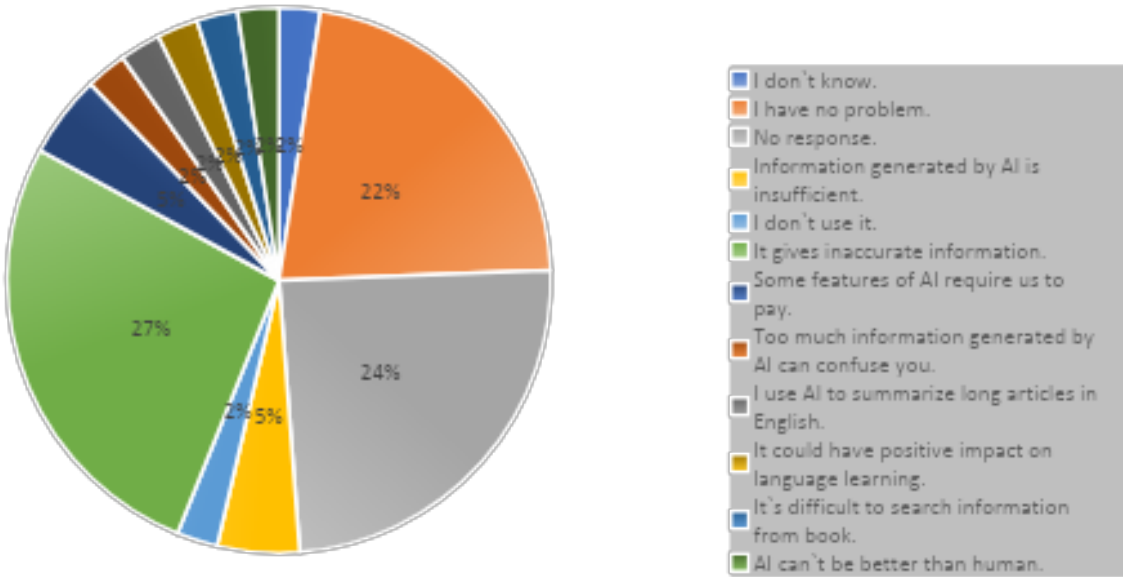
	I`ve used AI-generated essay outlines to efficiently arrange my ideas before writing.	Using AI aids has increased the clarity and coherence of my works favorably improving my writing style.

Spearman's rho	I`ve used AI-generated essay outlines to efficiently arrange my ideas before writing.	Correlation Coefficient	1.000	.690**
		Sig. (2-tailed)	.	.000
		N	41	41
	Using AI aids has increased the clarity and coherence of my works favorably improving my writing style.	Correlation Coefficient	.690**	1.000
		Sig. (2-tailed)	.000	.
		N	41	41

**. Correlation is significant at the 0.01 level (2-tailed).

In this study, we have used Spearman`s rank correlation test to determine whether there is correlation between the use of AI-generated essay outlines by students prior to essay writing and the improved coherence and clarity of their essay writing after using AI essay generators. As it can be inferred from table 10 the Spearman`s rank correlation coefficient is calculated as 0.690, indicating a strong correlation between the two variables. Hence, it can be concluded from the correlation analysis that the AI-generated essay outlines enable students to enhance the clarity and coherence of their essays. (Table 10)

Figure 1: Difficulties students face when they use AI



When students were asked what difficulties they faced when they used AI, the students gave the following responses:

- 27 per cent of the students acknowledged that AI has inaccuracies and errors
- One fifth of the respondents replied that they did not face any difficulties when they used AI
- Less than quarter of the students did not give any answers
- 5 per cent of the students said that the information generated by AI is insufficient

- The rest of the students said some features of AI require them to pay, getting too much information can confuse them, AI cannot be better than human etc.

The answers for the open-ended question demonstrate that students various problems when using AI which shows that the students need support and training to use the AI tools more effectively and improve their academic writing skills.

Discussion

As use of AI in education has been increasing in importance, it was significant to study the topic. The present research explored the students` knowledge and perceptions about AI tools used in academic essay writing, identified the frequency and extent to which students use AI, looked at the impact of AI in academic writing and students` perspectives on how AI should collaborate with human writers in the future. The participants of the study have acknowledged the advantages, use and its positive impact of AI on their ability and writing skills.

The students who participated in the research have expressed their interest and motivation on using ChatGPT for writing academic essays. The findings show that more than half of the students were aware of the AI-powered writing tools for academic essays. The Spearman correlation analysis between the students` use of AI-generated essay outlines and general writing ability demonstrated a statistically weak relationship whereas the Spearman correlation analysis between AI-generated outlines and writing styles showed statistically significant relationship.

The findings previous study concluded that AI tool can have positive impact on the students` writing quality, in particular improving the content and organization. (Marzuki, Widiatti, Rusdin, Darwin, & Indrawati, 2023) Results of the present study aligned with the study and demonstrated that using AI tools before writing essays has positive correlated with the general writing ability and improved clarity and coherence of the essay.

Students need to know that ChatGPT is not a sentient creature but rather an artificial intelligence model which has an ability to generate text. (Mhlanga, 2023) Therefore, it is crucial for students to be able to question the content generated by ChatGPT and teachers ought to help the learners develop critical and educated viewpoint on the application of artificial intelligence in the classroom.

Conclusion

In order to use ChatGPT effectively, students must have an adequate background in the relevant field of study so that they can generate appropriate prompts and critically evaluate the responses provided by the system. (Shoufan, 2023) This means that ChatGPT should not be relied on only resource for learning by students who do not have sufficient prior knowledge. (Shoufan, 2023) Students should be aware that relying too much on AI could negatively affect their academic integrity, writing ability and critical thinking.

Students find it easy to engage in natural language models used in ChatGPT. Students might feel comfortable and less thoughtful when composing their queries to less accurate responses. Thus, it is important for educators and instructors to teach students effective techniques for generating prompts and evaluating responses. (Shoufan, 2023). Students then need to verify the accuracy of the information by exploring and checking the information provided by other reliable sources of information. It is important for them to identify the sources of information that is either likely to provide accurate or inaccurate information.

While using AI in classroom, it is important for learners to be aware of its limitations that it may have content which is unreliable, biased or deceptive. (Mhlanga, 2023) As a result, the students may need to conduct in-depth analysis of the data and learn to differentiate the reliable from unreliable sources of information. Critical thinking is the main issue that will be challenged as a result of using AI in learning, particularly academic writing. Having questions answered or paragraphs written by ChatGPT may make it difficult to decide whether the information is accurate or not. (Dans, 2023) If people accept the results and answers provided by Gooogle or ChatGPT uncritically, this could lead them to depend on a tool such as ChatGPT which may manipulate them. (Dans, 2023) Thus, it becomes crucial for educators, parents and students to start thinking about the proper use of AI in learning and develop the critical thinking skills.

In the foreseeable future, generative AI could potentially be widely used in formal academic settings, institutions should also develop policies and provide formal guidance on the use of Generative AI. AI Ecological Education Policy Framework Policy suggested by Chan aimed to deal with different implications of AI Integration in university teaching and learning with the following three dimensions: Pedagogical, Governance and Operational. Institutions need to consider providing educational resources and workshops to familiarize students with GenAI technologies and their ethical and societal implications. (Chan, A Comprehensive AI Policy Education Framework for University Teaching and Learning, 2023) This will allow students to make informed decisions when using these technologies in their learning. Higher education institutions need to consider rethinking their policy, curricula and teaching approaches to better prepare students for future where GenAI technologies are prevalent. (Chan & Hu, Students` voices on generative AI: perceptions, benefits, and challenges in higher education, 2023) Stating clear guidelines on the use of AI in higher education context in particular university will enable students to realize the importance of the matter and use it properly without relying too much on it.

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UKRAINE, A PAWN IN GEOPOLITICAL CHESSBOARD OF AMERICA

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Abstract. The big powers play in such a big role and efficient movement in the geopolitical chessboard. As a result, small countries mostly suffer and lose in that game. That is one exact example is Ukraine, the biggest casualties in Russia-Ukraine war including soldiers, political and economic situation decrease since Russian invasion. Therefore, some researchers say that there is no winner in this war that has left a trail of death and destruction. Other researchers say Ukraine is smaller country comparing to USA and Russia, so America's geopolitical chessboard's pawn is Ukraine. Zbigniew Brzezinski's book "The Grand Chessboard" was written about strategies for maintaining America plays dominant role in international relations. The book surveys the different nations in Eurasia, from Japan in the east to the UK in the west. The entire landmass of Europe and Asia is covered. That is the current geopolitical chess play of America which takes place in Ukraine. This research is to determine how Ukraine plays role as a pawn of geopolitical chess game between Russia and U.S. Russia-Ukraine war officially began three years ago. Therefore, EU leaders and America sponsored Ukraine and gave financial support till now. Since Donald Trumph became 47th president of America, he tries to negotiate table for peace for Russian President Putin. But both sides haven't negotiated peace today. This research will be written comparison casualties and economic growth of Russia and Ukraine since war began.

Keywords: *Casualties, peace, war, NATO, refugees, civilians, military.*

Introduction

This research outlines the methodological framework employed to analyze the metaphor of chess as it pertains to international relations (IR). The goal is to determine how this metaphor is utilized in political discourse, literature, and strategic studies, particularly in relation to contemporary issues such as the Russia-Ukraine conflict. Political cartoons that have been deploying chess to read international competition for hundreds of years and to the other extreme of IR book covers (Amstutz, 2007) The Rules of Games and (Lebow, 2012) Tragedy and International Relations, relativising cooperation and competition of states behind a gender of zero-sum games à la checkmate: Who wins? Those concepts of Chess game theory would be main reference to chess games (Sullivan, 2012) Thus Zbigniew Brzezinski, the former national security adviser of President Jimmy Carter. There is a book called "The Grand Chessboard" written by him which inspired and conflicting between Russia and Ukraine.

Literature review

Russia and Europe form one of the most notable geopolitical hotbeds that both stems from and serves as the basis for Ukraine's existential issues. Due to constant strife among contending regional powers, Ukraine has served as an "opening" for many empires, which has caused it to act as a buffer state over the years. The collapse of the Soviet Union in 1991 enabled Ukraine to realize its quest for sovereignty, but dominating Ukraine's role in international relations by the Western powers and Russia made things tangled. NATO and the European Union along with the west acted as equal partners in supporting Ukraine to achieve Ukraine's intended

international relations. Still, Ukraine's efforts to deepen relations with those organizations were seen as attempts to politicize Russian counter influence. This led to a conflictual support framework along with supporting Ukraine's democratic aspirations. This explains why Russian seizure of is a long-standing deepening factor in the Eastern Ukraine conflict. Increased reliance on Western bloc and NATO further worsened Ukraine's political stability and economic conditions, while claiming to foster democracy under sharp territorial and militaristic mandates, other institutions severely altered the landscape.

Different scholars have researched Ukraine's role as a central geopolitical actor focusing on its strategic location in the middle of Western countries and Russia. Some believe Ukraine acts as a buffer state crucial to NATO's southeastern perimeter and energy sustenance of Europe. Other scholars argue that Ukraine is a pawn to bigger forces and its existence is oversimplified as being sandwiched between hostile powers from the West and Russia, revealing its weakness to geopolitical onslaughts. Kuzio argues that economic reasons are fundamental to understanding Ukraine's geopolitical situation. Its fertile natural deposits, especially in agriculture and energetics, make Ukraine an appealing associate of Western countries and Russia. While Ukraine's gas transportation routes to Europe heighten its significance as an energy pivot, the policies of dominant states concerning Ukraine are modified. Ukraine's role is frequently discussed by scholars from a political perspective, particularly concerning its position to the West and Russia. Some view Ukraine predominantly as a buffer zone crucial to NATO's eastern perimeter and energy and other natural resource interests in Europe. Other argue that Ukraine is used as pawn more powerful states who seek to exploit its geopolitical significance, exposing its vulnerability to Western and Russian external pressure. Although the economic dimension is crucial in understanding Ukraine's geopolitical position. Viladimir Zelensky once said the beginning of the war "Ukraine is one the richest country of natural resource. Especially agricultural and energy resources, makes Ukraine important of geopolitical chess pawn". Ukraine's gas transportation routes to the Europe also enhance of importance of chess game in International relations game. Researcher Nayalya Chernyshova was written an article named in 2021 "Ukraine Invasion: How Belarus has become Russia's pawn". She focused on how small countries were played in geopolitic game of great powers.

This study's contributions to research on the topic will be significant as it will highlight and determine the casualties of sides of Russia-Ukraine war. It will research how USA and NATO countries support Ukraine and thereby contributing to the knowledge base on how great powers play small countries in the geopolitical chessboard by citizens, economic, politic and natural resource. It could help small countries big example of pawn and how wrong person leads country to the suffering and loser country in the great powers' game theory.

Methodology

This study uses a quantitative method, combining detailed text analysis with case studies. This method helps to explore complex ideas in international relations and understand how chess metaphors are used in political discussions. We compare two groups: soldiers and citizens, as well as the impact of investments and war on politics and the economy from 2022 to now. Our research uses both primary and secondary information. The main focus is on the Russia-Ukraine war and the concept of the "great power game theory of pawn" to get a better understanding of the conflict. We examine the casualties on both sides by looking at reports, statements, interviews, and statistical data from various countries like the US, UK, Russia, Ukraine, and international organizations such as the World Bank, NATO, the EU, and the United Nations. It is noted that governments and the media can often be unreliable sources. Research shows, for example, that Western media, particularly when covering foreign conflicts like Ukraine, often reflect their own governments' views, as pointed out by Boyd-Barrett in

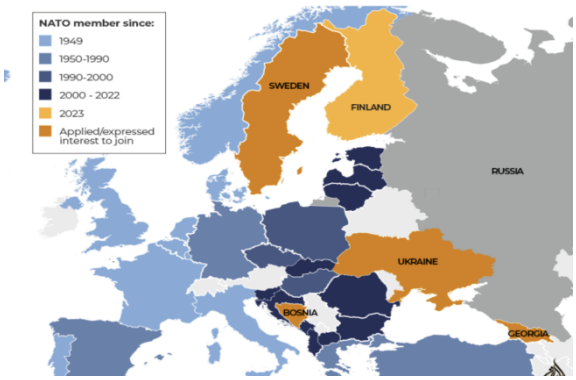
2016. Ukraine is not listed in UN's small countries list but comparing to the great powers including Russia, France, USA, and Germany. Ukraine is small country.

There is a significant amount of work on the Russia-Ukraine war, including research papers, scholarly articles, and various studies, such as those by Tamada & Asada (2024) and Kasinska-Metryka & Patomaki (2022).

The Roots of the Russia-Ukraine Conflict

The chain reaction began in 2014 when Ukraine showed interest in strengthening its diplomatic ties with the EU, which induced a negative response from Russia. Consequently, Russia made the first military attack on Crimea. This touched off a rapid military conflict between anti-Ukrainian groups, that were supported by the Russians, and the Ukrainian military force. The military alliance of NATO talked about their observations of Russian troops gathering near Donetsk, a situation that further fueled tension between the parties. The conflict also revealed the clashing of interests between the countries having a big impact on the world as it was undergoing a massive change in power. The military aspect of NATO was looking to place a buffer country between itself and Russia through Ukraine as it was also in the process of expanding its influence to the east. The United States was of the view that the EU was not sufficiently strong to push for the enlargement sought. The countries of Eastern Europe thus resolved to become members of the NATO rather than restricting their choices to the EU. This approach was in line with the NATO vision of producing a "Great and Free Europe."

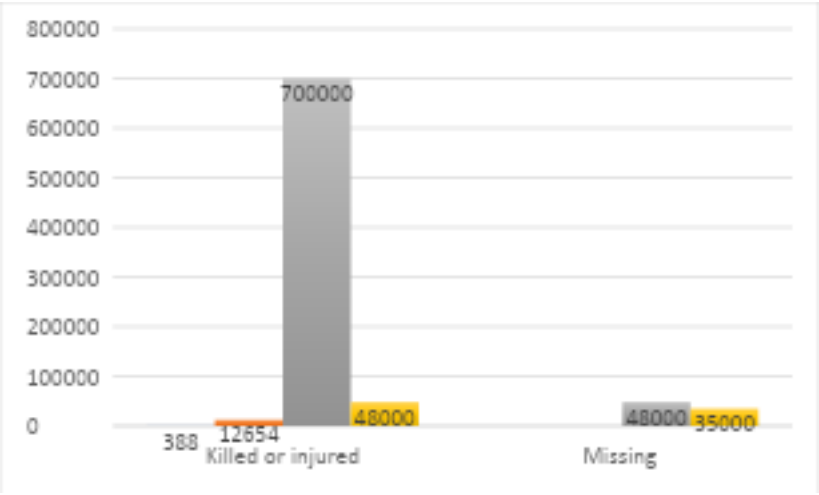
Fig 1: Enlargement of NATO



Source: NATO

Since 2022 both Russia and Ukraine have experienced simultaneous suffering among their citizens and military forces alongside economic and political hardships. Ukraine engages Western nations to support its conflict with Russia through economic and political coalitions.

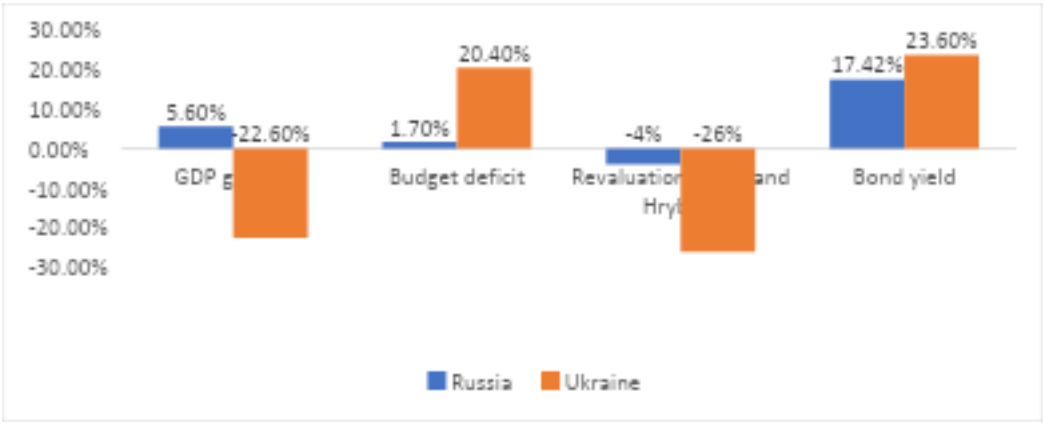
Fig 2. Number of comparison of Russian and Ukrainian casualties.



Source from statistica data 2025.

Compared to Ukraine, Russia is experiencing higher losses in terms of people killed and injured. Despite having a larger population of 146.1 million people compared to Ukraine's 38.7 million, Russia's casualities are greater.

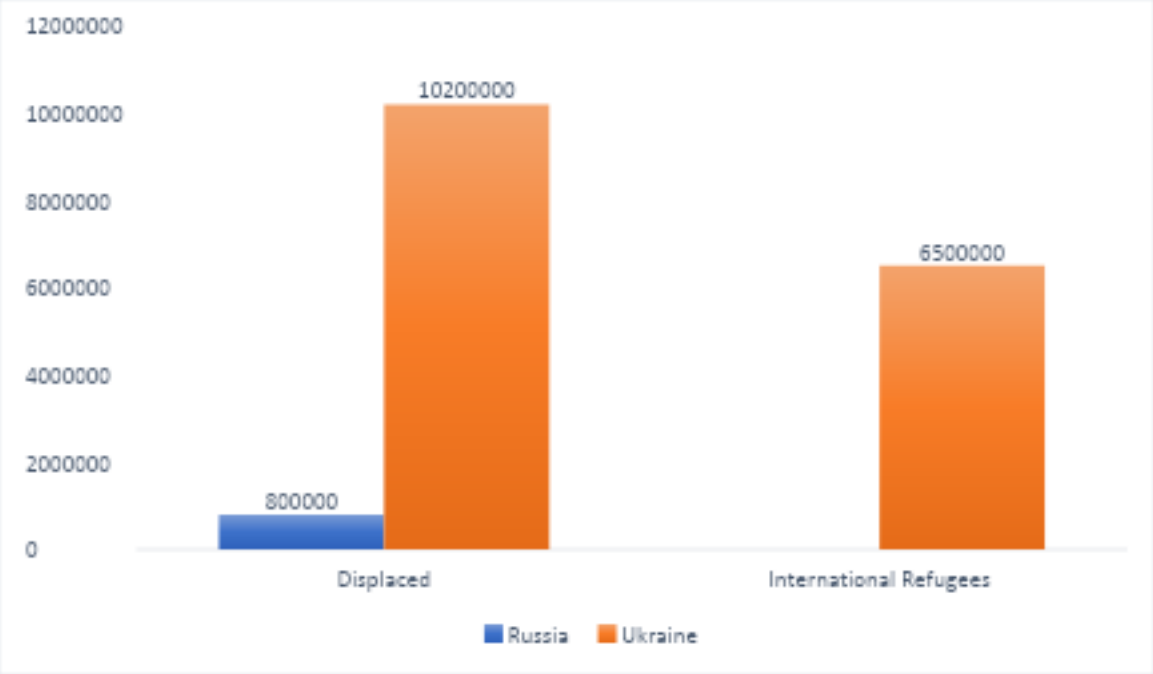
Fig 3. Russian and Ukrainian Economic impact comparison 2022-2024.



Source from World Bank reports 2022-2024

As shown in Figure 3, when we look at the economic impact on the two countries from 2022 through 2024, Ukraine is faring worse than Russia in several key areas, including GDP growth, budget deficit, currency revaluation, and bond yields.

Fig 4. Citizens displaced comparison 2022-2024.



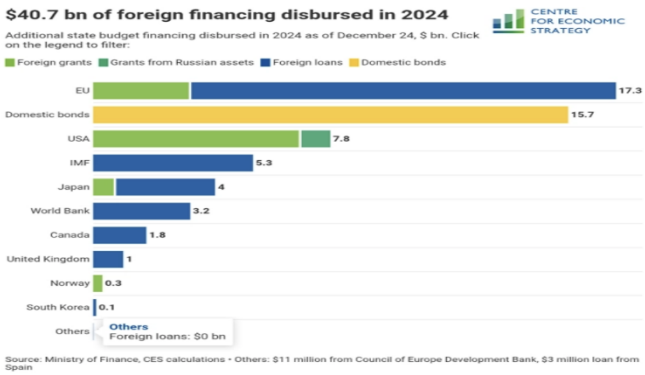
Source: https://www.statista.com/statistics/1293492/ukraine-war-casualties/

Fig 4. This figure illustrates the number of citizens displaced from two countries between 2022 and 2024. Russia saw 800 hundred of its citizens displaced, while Ukraine had a significantly higher number, with 102 million and 650 hundred people seeking refuge in other countries.

As illustrated in Figure 5, the main countries offering financial aid to Ukraine as of December 2024 are presented. Throughout 2024, Ukraine received $40.7 billion in foreign financing. The majority of this financial assistance has been provided through foreign loans rather than grants. Moreover, $15.7 billion was raised through domestic bonds.

On April 24, 2025, Martin Fornusek reported in The Kyiv Independent that Ukraine is grappling with a debt of $2.6 billion and is at risk of defaulting. This could mean Kyiv might default on a payment of around $600 million before the due date in late May (Fornusek, 2025). The IMF has cautioned that not settling the warrant issue could jeopardize further debt restructuring and its ongoing $15.6 billion bailout program, the Extended Fund Facility.

Fig 5. Financial support to Ukraine by country (Dec 2024).



According to a Reuters report from April 2025 on Ukraine's creditor nations, bilateral and multilateral loans from official creditors such as Canada, France, Germany, Italy, Japan, the

Netherlands, Poland, Britain, and the United States total $7.5 billion, with over $5 billion owed to Canada alone. These governments have agreed to a payment freeze until 2027. Ukraine's external state and state-guaranteed debt amounts to nearly $70 billion, which is almost two-thirds of the total in this category, owed to multilateral organizations. Similar to domestic debt, this amount is not subject to restructuring. Freezing debt is not best solution for Ukraine. If Ukraine ends up losing the war after 2027, it will likely be saddled with massive debt and could even default on its obligations. Ukraine and US just signed natural resource agreement on April 30, 2025. BBC news outlined the key points of the agreement, noting that it would cover initiatives related to minerals, oil, and gas, while ownership of these resources would stay with Ukraine. President Donald Trump has persistently advocated for this agreement as a necessary condition before providing any further security commitments to Kyiv. Most importantly, the proposed deal suggests that Ukraine will be granting Washington access to a portion of its natural resources in exchange for potential future US security support.

Result

This research aims to analyze the metaphor of chess in international relations (IR) and its application in contemporary issues like the Russia-Ukraine conflict. The concept of chess game theory is used to describe cooperation and competition between states, particularly in relation to the Russia-Ukraine conflict. Ukraine's existence is rooted in its strategic location between Western countries and Russia, acting as a buffer state for many empires. The collapse of the Soviet Union in 1991 allowed Ukraine to realize its quest for sovereignty, but dominating Ukraine's role by Western powers and Russia made things tangled. NATO and the European Union, along with the West, acted as equal partners in supporting Ukraine to achieve its intended international relations. However, Ukraine's efforts to deepen relations with these organizations were seen as attempts to politicize Russian counter influence, leading to a conflictual support framework and supporting Ukraine's democratic aspirations. Various scholars have researched Ukraine's role as a central geopolitical actor, focusing on its strategic location in the middle of Western countries and Russia. Some believe Ukraine acts as a buffer state crucial to NATO's southeastern perimeter and energy sustenance of Europe, while others argue that Ukraine is a pawn to bigger forces. Economic reasons are fundamental to understanding Ukraine's geopolitical situation, as its fertile natural deposits, especially in agriculture and energy, make it an appealing associate of Western countries and Russia.

This study's contributions to research on the topic will be significant as it will highlight and determine the casualties of sides of the Russia-Ukraine war. It will research how USA and NATO countries support Ukraine, contributing to the knowledge base on how great powers play small countries in the geopolitical chessboard by citizens, economic, political, and natural resource. It could help small countries understand the role of a pawn in the great powers' game theory and how the wrong person leads a country to the suffering and loser country.

Conclusion

This research highlights the complex interplay of cooperation and competition in international relations, with particular emphasis on the Russia-Ukraine conflict. Ukraine’s strategic geographic position has rendered it both a crucial buffer state and a pawn in the geopolitical contest between major powers. By analyzing the economic and political dimensions of the conflict, this study contributes to a deeper understanding of how smaller states navigate the intricate dynamics of global influence and the profound consequences of their geopolitical positioning.

The war between Russia and Ukraine has yielded no definitive victor; however, an examination of casualty figures and economic impacts suggests that Ukraine has borne a disproportionately greater burden. In response to this evolving conflict, the United States has sought to expand its geopolitical influence through NATO. Notably, Ukraine and Georgia were extended invitations to join NATO in 2007, a move perceived by some as contradictory to earlier assurances—such as those attributed to President George H. W. Bush—that NATO would not expand into Eastern Europe. This perceived breach of diplomatic expectations has further complicated international relations.

In this broader context, Ukraine occupies a pivotal role as a frontline state in a renewed contest between great powers. Moreover, the country's reliance on financial assistance from the United States and European Union has created additional layers of dependency, raising concerns about the sustainability of its debt obligations and the long-term implications of external support in a protracted conflict.

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The U.S.-China Rivalry in the Indo-Pacific and Japan's role

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Abstract. On January 20, 2025, U.S. President Donald Trump began his second term in office. He called for a fundamental shift in American foreign policy, moving away from the role of the "world's policeman" and instead advocating for the restoration of American hegemony. Viewing China as a primary challenger to its global leadership, the United States has adopted a policy of containment. This strategic rivalry is profoundly impacting global trade, international security, and the world order. Japan is a major power in the Indo-Pacific region, remains anchored by its post–World War II security alliance with the United States, which continues to be the cornerstone of its foreign and security policy. Amid intensifying U.S.-China competition, Japan's strategic objective is to support regional stability and prosperity while safeguarding its national interests. This article examines the root causes of the U.S.-China confrontation and analyzes Japan's strategic role amid this shifting geopolitical landscape.

***Keywords*:** *Indo-Pacific, rivalry, trade war, Japan, allies*

Introduction

At the end of the Cold War, Francis Fukuyama (1989) famously proclaimed the "end of history," arguing that the global diffusion of Western liberal democracy signified the ultimate ideological victory and marked the conclusion of mankind's political evolution. U.S. administrations under Presidents Ronald Reagan and George H. W. Bush anticipated that China, much like the post-communist states transitioning to free and open societies, would eventually pursue political liberalization alongside its economic reforms. However, the 1989 Tiananmen Square incident clearly signaled that Beijing would not follow the democratic trajectory envisioned by Washington.

Chinese leaders strategically positioned their country as a poor and underdeveloped nation, aiming to build trust with Western countries and attract foreign direct investment (FDI) by capitalizing on its abundant labor force and natural resources. During the Clinton administration, the United States supported deeper trade relations with China in an effort to integrate it into the global economic, financial, and trading systems. As a result of this extensive economic integration, China's economy rapidly expanded, allowing it to emerge as a global leader in trade, military capability, and technological innovation.

In contemporary times, China has been identified as the most significant strategic threat to the United States' national security (Office of the Director of National Intelligence, 2025). Strategic rivalry between the two powers has intensified across multiple domains, including economy, military expansion, technological innovation, and ideological influence. To preserve its status as the world's leading power, the United States has adopted a containment policy toward China. The Indo-Pacific region has become the primary arena of strategic competition between the two states. Escalating tensions over the South China Sea, Taiwan, and ongoing trade conflicts have only intensified this geopolitical rivalry.

As the global balance of power shifts, international relations have become increasingly uncertain, conflict-prone, and unstable. Japan, an economic superpower, plays a critical role in ensuring regional stability in the Indo-Pacific. As a democratic nation that has renounced war, Japan upholds universal values such as democracy, human rights, freedom, and the development of a global market economy. In an era marked by the decline of democratic values and rising threats to international peace, Japan's proactive foreign policy centered on peace and diplomacy is poised to play an increasingly important role on the global stage.

The Indo-Pacific Strategy

Since 2016, researchers have increasingly advanced the concept of linking the Indian Ocean with the Pacific Ocean, leading to the widespread official use of the term "Indo-Pacific" by regional governments today. The Indo-Pacific refers to a vast geopolitical space stretching from the western coast of the United States to the western shores of India (Özer, 2022). This term represents a politically constructed concept that underscores the strategic significance of a wide region encompassing key players such as India, Japan, Australia, Indonesia, and the member states of ASEAN. The Indo-Pacific region holds immense importance in terms of global trade, economic growth, security, and diplomatic relations. It is home to more than half of the world's population and accounts for approximately 60% of global GDP. Moreover, over one-third of all global maritime trade passes through the South China Sea, further emphasizing the region's military, political, and economic strategic relevance (CSIS, 2019).

According to the World Trade Organization, approximately 25% of global trade—equivalent to around $5 trillion in goods—passes through the South China Sea (Focus, n.d.). Moreover, the area off the coast of Vietnam is estimated to contain about 10 billion tons of crude oil and 1 trillion cubic meters of natural gas reserves. These resource-rich zones, combined with the strategic importance of maritime routes, have made the South China Sea a hotspot for regional security tensions.

The United States views the Indo-Pacific region as critical to its future security, economic prosperity, and geopolitical strategy. By 2022, trade between the United States and Indo-Pacific countries had exceeded $2 trillion. (Government, n.d.) During his first term in office, President Donald Trump implemented the "Indo-Pacific Strategy," which was not an entirely new initiative but rather a continuation of President Barack Obama's "Rebalance to Asia" policy introduced in 2011. Obama's administration redirected U.S. strategic focus from the Middle East to Asia, largely due to China's rapidly expanding influence in the Indo-Pacific region (Clinton, 2011).

Through the Belt and Road Initiative (BRI), China has strengthened economic ties and made significant investments in Asia, Africa, and Europe, thereby expanding its global economic footprint. Although China promotes the BRI as a platform for open dialogue, shared development, and mutual benefit, its construction of artificial islands and military outposts in the South China Sea has been criticized by Trump and regional states as a threat to the free flow of trade, sovereignty, and regional stability.

While the U.S. formally announced its "Rebalance to Asia" strategy in response to the region's growing economic importance, many observers viewed the initiative as a countermeasure to China's increasing influence. This strategic objective was made explicit during the 14th Shangri-La Dialogue on Asian security in 2015, when then Secretary of Defense Ashton Carter declared the establishment of a "new security architecture for the Indo-Pacific" (Carter, 2015).

He emphasized the U.S.'s commitment to countering China's increasingly assertive behavior, particularly in relation to territorial claims and militarization efforts in the South China Sea.

Figure 1: U.S. Indo-Pacific Strategy

Source: Drishti IAS

Furthermore, the United States' National Security Strategy of 2017 designated the Indo-Pacific as a region of critical geostrategic importance and described it as a "geopolitical arena of competition between free and repressive visions of world order" (WH, NSS, 2017). This revised framing introduced a clearer ideological metric into U.S. strategic discourse, reinforcing the perception of China as the primary challenger to the global order.

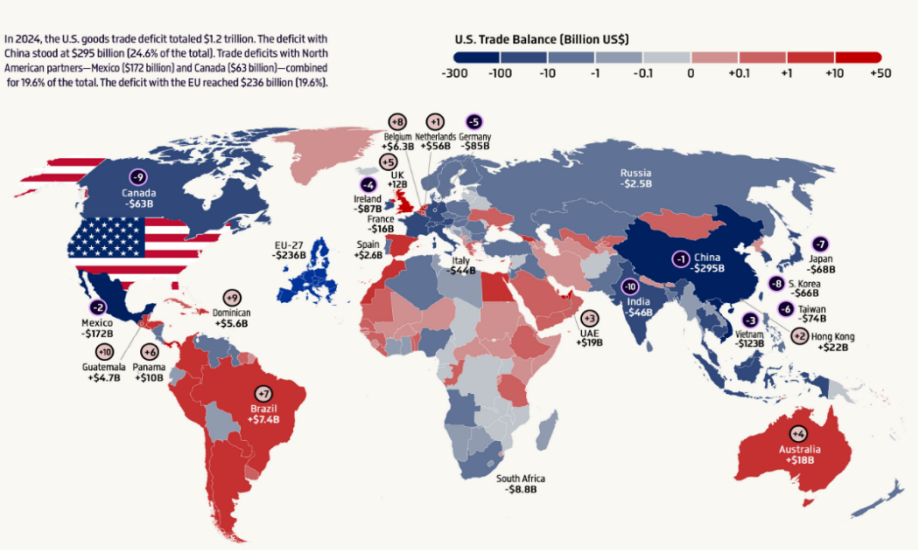
As part of this strategy, President Donald Trump initiated a trade war aimed at weakening China's economic growth, while simultaneously pursuing his "America First" policy to restore U.S. global leadership. Although signs of economic recovery were observed in the United States toward the end of his first term, the administration's aggressive tariff policies and unilateral, national interest-driven decisions ultimately undermined America's position on the world stage.

The U.S.–China Rivalry

The landscape of international relations is indeed undergoing a significant change. In the era of globalization, growing economic interdependence initially fostered hopes for sustained peace. However, these hopes have been increasingly replaced by stark realities, as major powers have re-engaged in fierce competition for prestige and influence (Kagan, 2008). Notable examples include the Russia-Ukraine conflict and the U.S.-China trade war.

Following the terrorist attacks in the United States in 2001, traditional conceptions of national security re-emerged, leading many countries to prioritize national interests and sovereignty over global concerns. In this context, President Donald Trump initiated the first phase of the "trade war" in 2018. Although the United States remained the world's largest economy, it was incurring substantial annual trade deficits with many of its trading partners, which the Trump administration sought to address through tariffs and renegotiated trade agreements.

Figure 2: U.S. Global Trade Balance in 2024



Source: U.S. Census

As of 2024, the United States recorded a goods trade deficit of $1.2 trillion. Of this, the trade deficit with China alone amounted to $295 billion, representing 24.6% of the total. Trade imbalances with key North American partners—Mexico ($172 billion) and Canada ($63 billion)—collectively accounted for 19.6%, while the deficit with the European Union reached $236 billion, also representing 19.6% of the total (Soltani, 2025). These figures highlight the structural imbalances in the U.S. trade landscape and have fueled debates over the effectiveness of American trade policy and the broader implications for economic security within the global economy.

In response, President Donald Trump, shortly after taking office on January 20, launched the second phase of the "trade war" as part of his "Make America Great Again" agenda. China's ambition to become the world's leading power by 2049, often framed through the narrative of the "Chinese Dream," contributed to the Trump administration's more assertive containment strategy toward Beijing.

In February 2025, the United States imposed a 25% tariff on imports from Canada and Mexico. On April 2, the administration announced plans to apply tariffs ranging from 10% to 90% on goods from over 90 countries (WH, 2025). This announcement triggered a sharp decline in global stock markets, including Dow Jones, NASDAQ, and the S&P 500, and caused significant turmoil in international financial markets.

The Chinese government strongly condemned Trump's tariff measures. In retaliation, President Donald Trump ordered tariff hikes on Chinese goods up to 145%. Chinese Foreign Ministry spokesperson Lin Jian criticized the U.S., stating, "Under the guise of mutual benefit, the U.S. seeks unilateral dominance by sacrificing the legitimate interests of other nations and prioritizing its own agenda over international norms and rules", declaring "We will fight to the end" (BBC, 2025). Similarly, Chinese senior diplomat Yang Jiechi asserted, "The U.S. is no longer in a position to speak to China from a position of strength" (Zhao, 2025), underscoring Beijing's firm stance against Washington's pressure tactics.

The primary cause of the U.S.-China rivalry is not merely the trade deficit. This rivalry encompasses issues of national security and technological advancement, reflecting a broader contest over global leadership and influence. President Donald Trump has criticized previous U.S. administrations for underestimating China's rise, failing to foresee the potential threats it

might pose in the future, and not taking the necessary and timely measures in response. Indeed, studies by U.S. foreign policy experts have shown that China's growing power and capabilities were often underestimated. For instance, Joseph S. Nye once described China as “a country with limited hard and soft power to challenge Western dominance” (Nye, 1990). Michael Beckley (2020) argued that China’s economic momentum was declining in comparison to the U.S., while Jude Blanchette and Ryan Hass (2025) maintained that the United States still held significant advantages over China in economic vitality, global influence, and technological innovation.

Although Beijing currently faces domestic challenges such as population decline, high youth unemployment, and government pressure on the private sector, China’s historical resilience suggests that these problems can be addressed in the near future. Since opening its economy in 1978 and initiating market reforms, China has achieved an average annual GDP growth rate exceeding 9%. Many in the U.S. believe that China’s current economic strength was made possible, at least in part, due to American engagement and support. Between 1980 and 2004, U.S.–China trade grew from $5 billion to $231 billion (Council on Foreign relations, 2024). China became one of the key beneficiaries of globalization, capitalizing on a unipolar world order, the U.S. Navy's security umbrella, and access to the global free trade system.

In 2010, China overtook Japan to become the world’s second-largest economy. The launch of the Belt and Road Initiative further enhanced its global influence by financing infrastructure, logistics, and development projects across multiple regions. As a result, China’s international prestige increased, while U.S. global leadership appeared to decline.

In recent years, U.S.–China competition has expanded dramatically in the field of technology. To strengthen its global market position, China has heavily invested in science and technology sectors, promoting innovation in artificial intelligence, 5G networks, robotics, and e-commerce. Consequently, China has emerged as one of the primary competitors to the United States in the global technology race (Doshi R. , 2022). With manufacturing capabilities nearly double that of the U.S., China has made significant advances in various industries—from electric vehicles to fourth-generation nuclear reactors. It now leads in both active patents and highly cited scientific publications (Doshi K. M., 2025), underscoring its rising status and competitiveness in global technology.

To effectively contain China, the United States must maintain close cooperation with its allies and partners. The U.S.–Japan alliance has expanded strategic collaboration in technology sectors such as semiconductors, artificial intelligence, and quantum computing. A memorandum of understanding on semiconductor partnership was signed to reduce dependence on Chinese technology and safeguard critical supply chains. Although President Donald Trump imposed high tariffs and applied pressure even on close allies and partners, he later softened his stance—widely interpreted as a tactic to rally support and reaffirm the United States' position as the world's most powerful and influential nation.

As China’s economy expands, so does its defense capability. In recent years, Beijing has intensified its military presence in the South China Sea—a vital maritime trade route within the Indo-Pacific region. One of the most contentious issues in U.S.–China relations remains Taiwan. In 1979, when the U.S. established diplomatic ties with Beijing, it pledged to uphold the "One China" policy. However, to advance its strategic interests in the Indo-Pacific, the U.S. began providing military assistance to Taiwan and pledged to defend the island should Beijing attempt reunification by force. On March 8, 2021, President Joe Biden declared, “We will stand with our friends and allies to advance prosperity, security, and values in the Indo-Pacific. We will fulfill our long-standing commitments. We will continue to support Taiwan in maintaining

a sufficient self-defense capability." During his official visit to Asia in May 2022, Biden further stated that the U.S. would use military force to defend Taiwan if China acted aggressively (Ulambayar.D, 2022). In response, Chinese President Xi Jinping warned that U.S. support for Taiwan amounted to "playing with fire" (Council on Foreign relations, 2024).

The Quadrilateral Security Dialogue (QUAD) plays a strategically vital role in ensuring Indo-Pacific security. The U.S. has sought to deepen cooperation through initiatives such as QUAD and AUKUS and strengthen ties with the EU, ASEAN, and NATO. President Trump emphasized the need to reform the traditional alliance system, which has relied on the U.S. nuclear umbrella since the Cold War. This includes demanding that allies increase their defense budgets to as much as 5% of GDP, ensuring more reciprocal responsibility. A network of strong allies is undeniably crucial in enabling the United States to compete more effectively with China.

Kurt M. Campbell, U.S. Deputy Secretary of State, has emphasized the need to transform the existing alliance system into a more capable platform in military, economic, and technological domains. In this regard, Japan and South Korea are contributing to the construction of U.S. naval vessels, while Taiwan is cooperating with the U.S. to build semiconductor manufacturing plants. Moreover, the U.S. has committed to sharing its most advanced military technologies with its allies. These joint efforts represent a coordinated response aimed at balancing China's growing regional and global influence (Doshi K. M., 2025).

The U.S.-China Rivalry and Japan's Role

Japan maintains a security alliance with the United States while simultaneously engaging in deep economic and trade relations with China. In recent years, China's growing presence in the Indo-Pacific region, coupled with North Korea's escalating nuclear threats, has made Japan's role increasingly vital in ensuring regional security.

Japan's economy is heavily dependent on China's economic growth and stability. Since 2007, China has been Japan's largest trading partner, with bilateral trade reaching USD 350 billion in 2023. Moreover, in 2024, Japan's direct investment in China amounted to USD 3.2 billion, demonstrating the depth of economic cooperation between the two nations (Nikkei, 2025). However, the intensifying U.S.–China trade war in recent years has led to a decline in Japanese investment in China. In response, the Japanese government has adopted a "de-risking" strategy aimed at reducing economic dependence on China. This includes diversifying supply chains, relocating Japanese-invested factories from China to Southeast Asia, and enhancing domestic capacity in strategic sectors.

The United States is Japan's second-largest trading partner, accounting for 13.9% of Japan's total trade [newsgawakaru, 2024]. Conversely, Japan contributes approximately 4% of U.S. imports, ranking fourth after Canada, Mexico, and China. On February 7, 2025, Japanese Prime Minister Shigeru Ishiba visited Washington, D.C., and, during a meeting with President Donald Trump, expressed Japan's intention to strengthen bilateral relations and increase Japanese investment in the U.S. to USD 1 trillion (Japan, 2025). Nevertheless, President Trump's decision to impose a 24% tariff on Japanese imports posed significant challenges to Japan's economy and its automobile manufacturers. As the U.S. represents Japan's largest automobile export market, many companies have been forced to close overseas plants, relocate production to the U.S., or reduce their workforce due to declining sales. Japan's top 1,000 companies expect a seven percent drop in their total profits between April 2025 and March 2026 (Terazawa, 2025).

Japan has also launched and promoted the "Partnership for Quality Infrastructure" initiative, aimed at contributing to development across the Asia-Pacific region. This initiative prioritizes transparency and sustainability in infrastructure development, with the broader goal of fostering regional stability and long-term economic growth. As a strong advocate of multilateral cooperation, Japan actively participates in major international trade frameworks such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the Regional Comprehensive Economic Partnership (RCEP). Japan is also working to expand its network of partnerships by deepening relations with the European Union, Australia, India, and ASEAN countries. Under its vision for a “Free and Open Indo-Pacific,” Japan seeks to build a broad coalition of like-minded allies committed to regional stability and economic openness.

Japan consistently upholds international trade rules and standards, firmly supports the principles of free trade, and continues to urge other countries to adhere to international legal norms. This advocacy reflects Japan’s broader foreign policy objective of mitigating tensions during the U.S.-China trade war.

Thus, Japan is pursuing a dual-track strategy: maintaining stable economic relations with China while simultaneously strengthening its security alliance with the United States. However, as strategic competition between the two great powers intensifies, the implementation of this “dual strategy” is becoming increasingly complex and poses significant challenges.

Instability and heightened tensions in the Indo-Pacific region pose a serious threat to Japan’s economic growth and energy security. Therefore, Japan seeks to prevent the escalation of U.S.–China rivalry into regional crises or military conflict. In recent years, Japan has increased its defense budget and deepened security cooperation with other partners, including Australia, India, the European Union, and NATO. As a member of the Quadrilateral Security Dialogue (QUAD), Japan actively promotes a strategy to balance China’s growing influence in the region. With rising tensions in areas such as Taiwan and the South China Sea, the risk of military conflict between Washington and Beijing is increasing—and Japan could be drawn into such a conflict.

In navigating this geopolitical rivalry, Japan strives to maintain a balanced foreign policy and avoid overt alignment with either side. On the one hand, Japan contributes to regional stability and deterrence by hosting U.S. military bases under the U.S.–Japan security alliance. On the other hand, its deep economic ties with China mean that a prolonged U.S.–China trade war could inflict significant economic damage, including supply chain disruptions. Given these circumstances, Japan must formulate a responsive and adaptive strategy to manage the risks and challenges posed by intensifying U.S.–China competition.

Going forward, Japan should play an active and leading role in strengthening the rules-based international order, enhancing measures to safeguard national security, actively pursuing economic diplomacy, and contributing to the resolution of common challenges and pressing global issues facing humanity.

Conclusion

The "Indo-Pacific Strategy" represents a geopolitical framework by the United States aimed at containing China’s expansion and safeguarding its global leadership. The U.S.-China rivalry can fundamentally be seen as the result of two divergent strategic approaches. From a game theory perspective, President Donald Trump’s decision-making strategy aligns with a "zero-sum" game, whereas China operates based on a "positive-sum" game framework.

President Trump's primary strategy is to maintain U.S. global leadership by strengthening American power and collaborating with strong allies to contain China's expansion. Although Trump may currently hold the most influential strategic cards, it is important to recognize that his decisions could inadvertently create strategic advantages for China. Specifically, his decision to increase tariffs may accelerate the relative decline of the United States and potentially hasten the emergence of a new global order.

China's response to U.S. tariffs suggests that Beijing views the trade war not as a fundamental threat, but rather as a tolerable challenge. China's decades-long period of "strategic weakness" in its competition with the United States appears to be coming to an end, driven by steady advances in its industrial, technological, and military capabilities, as well as its growing international influence (Zhao, 2025). Although the likelihood of direct conflict between the United States and China remains low, it is imperative for the U.S. and its allies to take serious note of the shift in Beijing's strategy.

As U.S.-China competition intensifies, Japan—a nation that upholds democracy, human rights, freedom, and peace—is expected to play an increasingly vital role in the region. Therefore, it is essential for Japan to strengthen its ties with the United States and other allies and partners, while also maintaining open channels of communication with Beijing to enhance its ability to prevent further escalation. Japan should actively pursue diplomatic efforts that promote the importance of peace, helping to lead the world from division toward cooperation.

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Efficiency of Mobile Learning to Enhance Vocabulary in ESP

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Abstract. This study investigated the effectiveness of Kahoot the mobile application in enhancing English vocabulary acquisition in ESP contexts. We conducted a trial training on students' acquisition of English vocabulary over two academic years involving 76 students from the second and third years of Mandakh University who studied or studying ESP. In order to assess our training outcome, 15 questionnaires were developed and the results were processed by qualitative (targeted sampling and factual research) and quantitative (frequency, descriptive, reliability, factor and crosstab) methods through IBM SPSS 2021. The descriptive statistics' result indicates that the 76 students rated the effectiveness of the Kahoot program as good on average. Crosstab statistics revealed that 68% of respondents strongly agreed that using Kahoot program helped them understand the main points of the lesson through vocabulary and other explanations in ESP. There is a strong direct correlation between the usability of the Kahoot (factor 2) and its impact on learning outcomes (factor 3). So that, the participants supported the positive impact of Kahoot on vocabulary learning. The students' lexical knowledge improved by 30.7% between pre and post-tests, demonstrating the effectiveness of the training. For the interview study, this program, with its easy and fun features, increases students' competitiveness, encourages activity, and allows for self-assessment, but it lacks in providing in-depth knowledge of words in interview study. For the observation result, Kahoot can trigger students' interest in participation, fun, and education. However, there were some difficulties related to connectivity and concern for competitiveness rather than language acquisition.

Keywords: *Mobile learning effectiveness, ESP lexicon, Multimedia tool, Kahoot program, Trial training*

Introduction

With the rapid development of communication technology, more e-learning opportunities have emerged, and suitable mobile applications for language learning have developed, creating an innovative way of learning modern languages. When learning a foreign or second language, acquiring knowledge of the language's vocabulary is a priority, and how and in what way to learn directly affects the learning outcome. The basic concept of learning a foreign language is to build a vocabulary (Shen, 2003). Researchers Cortazzi and Jin have stated that vocabulary is the most important foundation for learning a foreign language. The biggest problem foreign language learners experience is vocabulary problems, and researchers have noted that having

a good vocabulary is an important indicator of developing reading skills (Nation, 1994). The more new words a student knows, the greater the chance of understanding the original text (Ж.Төрсөө, 2020). Effectively learning a foreign language means using appropriate learning strategies (Meschyan, 2002). Language learning strategies are used to acquire English skills, especially among second (foreign) language (EFL) learners. Many studies have shown that language learning approaches, strategies, and proficiency are related (Liu, 2004). Studies have shown that the more strategies he uses, the higher the probability that his English level will increase (Magno, 2010). Learners use a combination of different strategies and cognitive processing activities to acquire a second language, and recently, there has been a trend toward using mobile applications and some programs as e-learning tools that are easy to use and suit their interests (Magogwe, 2007).

Therefore, this study aims to explore the impact of Kahoot on vocabulary learning in ESP classrooms. Our objectives are:

- to examine the effect of Kahoot-based learning on ESP vocabulary improvement
- to evaluate students' attitudes toward mobile-assisted vocabulary learning.

Based on these objectives, this study seeks to answer the following research questions.

1. How does Kahoot affect learners' vocabulary acquisition in ESP courses?
2. What are students' perceptions of Kahoot in terms of usability and learning effectiveness?

Literature review

Concept of Mobile Learning

In the last decade, there have been many changes in the teaching and learning of English. Users define mobile learning (M-Learning) as a new learning method using mobile platforms. It combines all the advantages of modern education, computer network technology, mobile communication technology, and multimedia technology. The main advantage of mobile learning is the most accessible and convenient distance learning, which allows students to learn regardless of space and time. Although "mobile learning" is being implemented worldwide, it is still in its infancy regarding teaching technology and methodology. However, the number of students participating in mobile e-learning will soon exceed the number of computer users surfing the Internet as many new technological opportunities can be implemented within the training framework, and "Mobile e-learning" will undoubtedly become an important learning platform (CSATA, 2004). A study by Ericsson, a mobile phone manufacturer, estimated that by 2015, 80% of people will access the web on their smartphones or other devices, and educational learning will move in this direction (Johnson, 2005). A 2011 Horizon study stated, "Mobile Learning is the fastest growing sector in the education sector." With the advancement of information technology, millions of students are taking their higher education online.

Furthermore, students can access information and take courses from anywhere, at any time, regardless of location or time. As mentioned, multimedia is a one-way lesson for learners without time or space constraints. Groot developed a program called CAVOCA (Groot, 2000) that aims to provide bilingual learners with basic vocabulary through a multimedia environment, and it includes the following three stages of learning: 1) Observation, 2) Connection, 3) Integration

Learning is effective when students can move through these three stages during their learning process. For example, in Groth's study, when a student encounters a new word, they use an app to click on the word, then see its meaning in the form of a picture and listen to its pronunciation (the observation stage), and then write down the words that mean the same thing to the word

in order to connect the knowledge they are learning with their background knowledge. Groth's results support the theory of three-stage vocabulary acquisition through multimedia tools. Groth suggested that students learning a foreign language benefit from using their native language vocabulary knowledge to learn foreign language vocabulary and that it is more effective to give presentations and practice in two languages (Groot, 2000).

As technology and computers have affected all aspects of human life, multimedia tools have become increasingly used in teaching and learning foreign languages. Previously, only experts could use computers and technology, but today, they are accessible to everyone and are widely used in language learning. Many teachers have switched to a new way of teaching foreign languages using multimedia tools that are more effective than traditional textbooks. One of the many programs used to improve English vocabulary in a multimedia environment is Kahoot. The Kahoot is a free game-based platform that attractively presents questions and promotes learning through exercises and competitions. Furthermore, it allows teachers to check students' performance since the results of the activities are saved as data. There are many different activities in Kahoots, including challenges, conversations, riddles, polls, and quizzes. Teachers may build game-based and research-based quizzes, which help students learn English, and students can join the game through a QR code and pin. After choosing their answers on their gadgets, students engage with the questions shown on their smart boards (Johns, 2015). Additionally, multimedia graphics and videos can be used in Kahoot quiz questions to keep students interested (Dellos, 2015). Students receive points for accurately and promptly answering questions. Kahoot quiz questions can also include multimedia visuals and movies to keep students interested. Students can earn points by correctly and rapidly answering questions. Researchers have found that Kahoot is currently used extensively in English instruction. Students' desire and focus on learning English have increased because of Kahoot. Nguyen and Yukawa discovered that Kahoot has a beneficial impact on learning English. In order to better understand how Kahoot can impact students' vocabulary, the researcher wanted to find out how effective it is at helping them expand their vocabulary. The use of Kahoot to enhance English language learners' vocabulary is the main focus of this study since it seeks to determine whether students have improved their knowledge-specific vocabulary. This study evaluated how well Kahoot works to help students increase their English vocabulary.

Optimizing english vocabulary learning through multimedia

The 1983 TESOL Conference in Toronto recommended multimedia in foreign language teaching, which led to a paradigm shift in foreign and second language teaching and learning. Mayer proposed the Cognitive Theory of Multimedia, which explains how perception occurs through the verbal and visual systems (Mayer R. E., 2002). This theory includes the dual coding theory based on three important assumptions. The first is the Dual Channels Assumption, which explains how learning occurs by seeing and hearing. The second is the Limited Capacity Assumption, which explains the limited capacity of structures. The third is the Active Processing Assumption, which explains how people actively participate in the construction of knowledge. Multimedia presentations can convey verbal and visual information and demonstrate logical connections between words and images, either verbally or graphically. Although the two structures are interchangeable, they differ because images produce non-linear, integrated information, while words produce discrete, linear output. By combining these two methods, learners make the necessary connections between visual and verbal learning processes and integrate both into their memory. Mayer proposes the results of his theoretical experiments, concluding that avoiding overloading active memory with information is helpful, for example, by representing words with pictures, presenting information with images, or using multimedia when presenting information. Recent studies support the use of Kahoot for vocabulary learning. Ahmed (Ahmed, 2022) found that Kahoot significantly improved EFL learners' vocabulary retention compared to traditional methods. Similarly, Truong and Dinh (Truong, M. T., & Dinh, H. N, 2024) reported that students perceived Kahoot as motivating and engaging, though some noted limitations like internet dependency.

In ESP contexts, Fursenko (Fursenko, 2024) showed that Kahoot enhanced the learning of specialized vocabulary and increased student performance.

It is effective for learners to learn a new word by repeating it repeatedly, seeing pictures representing its meaning, and making connections. Mayer's findings are based on studies of native speakers, but other studies have supported similar findings with second language learners (Mayer R. E., 2002).

Multimedia refers to computer-based systems that use various content, including film, video, moving images, slide projectors, multimedia games, text, audio, graphics, and interactive media. Multimedia devices are learning tools that use computer technology to present information using sight and sound. Mayer and Anderson proposed the "Contiguity principle," which describes the effectiveness of multimedia instruction when words and images are presented together in the same time and space. This study draws on Mayer's Cognitive Theory of Multimedia Learning, which emphasizes dual-channel processing and active engagement. Kahoot supports this by combining visuals, text, and feedback, helping students better retain ESP vocabulary through interactive, game-based learning. Based on this, many mobile applications related to foreign language learning have emerged, which present the target content in an easy, simple, and enjoyable way for learners, increasing their motivation to learn and making learning activities more effective.

Methodology

We designed a questionnaire consisting of three sets of 15 items focused on the effectiveness of the Kahoot application as a tool for English vocabulary acquisition. The questions were taken from previous studies related to our article. The study employed a purposive sample of 76 second- and third-year students at Mandakh University who were enrolled in English for Specific Purposes (ESP) courses. Data were collected through Google Forms and analysed using both qualitative and quantitative methods. The qualitative approach included factual analysis, targeted sampling, semi-structured focus group interviews, individual interviews, and classroom observations. The quantitative approach utilized IBM SPSS Statistics (2021) for frequency analysis, descriptive statistics, cross-tabulation, correlation, and factor analysis. To measure learning outcomes, we implemented a trial training (a structured instructional intervention using Kahoot-based vocabulary lessons conducted over a two-year period to evaluate its pedagogical impact) over two academic years. This intervention involved administering 259 ESP-related Kahoot questions, categorized into 23 lesson topics. The quizzes were conducted 134 times, with a cumulative participation count of 1,895 (including repeated participation across four academic years). Students' lexical improvement was assessed through pre- and post-tests administered before and after the Kahoot-based intervention. The reliability of this study was ensured through triangulation: a theory-driven literature review, a validated questionnaire design, and the integration of both qualitative and quantitative methods.

Result

We considered the impact of the mobile learning program on vocabulary learning in the ways of trial training including Kahoot lessons and questionnaires aimed at how Kahoot was beneficial for the student to gain vocabulary in ESP that have been teaching at Mandakh University using both quantitative and qualitative methods. In addition, we administered vocabulary progress tests before and after the study, and during the trial-training period, we

taught three types of ESP courses and gave pre and post-tests for each. Then, we averaged the test scores and calculated their vocabulary knowledge progress.

Table 1. Improvement between pre and post test

Course	Pre test	Post test	Advancement
ESP 1	45%	73%	28%
ESP 2	36%	64%	28%
ESP 3	42%	78%	36%
Total	41%	71.6%	**30.7%**

In table 1, the students' lexical knowledge was measured by 41% at the pre-test, but after the trial training, it reached 71.6%, and the students gained 30.7% of improvement, which can be concluded that the training was effective.

Table 2. The number of Kahoot lessons for ESP and frequency of play

№	Content of Kahoot lessons for ESP	Number of questions	Number of attendees	Frequency of play
1	Balance sheet	10	46	3
2	Jobs in accounting	13	65	4
3	Business English vocabulary	20	152	13
4	Your job	10	40	2
5	Tax haven	16	11	1
6	Budgeting and auditing	13	13	1
7	Intangible assets	10	62	4
8	Direct and indirect cost	10	41	3
9	Depreciation	10	71	4
10	Internal controls	8	32	2
11	Controllers	10	18	1
12	Guiding principles	10	37	2
13	The back office	10	17	1
14	World trade organization	10	99	7
15	Global economy	10	142	10
16	Business in different cultures	10	84	7
17	Making presentation at a meeting	10	95	8
18	Types of meeting	10	166	10
19	Time management	10	184	13
20	Negotiations	9	167	14
21	Skills and qualifications	15	203	12
22	Figures and ordering numbers	15	104	8
23	Greetings	10	46	4
Total		***259***	***1895***	***134***

When conducting the study, we first developed 23 types of tests above with questions aimed at improving students' vocabulary knowledge in a simple program, and then used them with target students for 2 years. We used Kahoot twice a week to revise the lexical knowledge of the students. Totally, 1895 students used 23 Kahoot lessons for 134 times. Furthermore, in order to test its output, we prepared a questionnaire with 15 questions and summarized the results in the following tables.

Table 3. Reliability Statistics (SPSS)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.873	.881	15

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.829
Bartlett's Test of Sphericity	Approx. Chi-Square	458.685
	df	105
	Sig.	.000

Table 4. KMO and Bartlett's Test (SPSS)

The above analysis showed that the Cronbach's alpha coefficient was 0.873 (Table 3) and KMO was 0.829 (Table 4), indicating that the reliability of the questionnaire and the sample size were sufficient. These indicators are statistically significant, so the analysis can be carried out.

Table 5. Descriptive Statistics (SPSS)

№	N	Min	Max	Mean	Std. Deviation
1	76	3	5	**4.47**	.663
2	76	2	5	**4.03**	.816
3	76	3	5	**4.37**	.670
4	76	3	5	**4.50**	.622
5	76	3	5	**4.66**	.555
6	76	2	5	**4.61**	.613
7	76	3	5	**4.41**	.657
8	76	3	5	**4.59**	.521
9	76	1	5	**4.39**	.834
10	76	3	5	**4.61**	.613
11	76	3	5	**4.26**	.737
12	76	3	5	**4.43**	.618
13	76	1	5	**3.08**	.829
14	76	3	5	**4.43**	.660
15	76	2	5	**4.54**	.576

For the descriptive statistics result: in the table 5, the mean values of the 15 variables ranged from 3.08 to 4.66, with a standard deviation of 0.521 to 0.829, indicating that the 76 students who participated in the study rated the effectiveness of the Kahoot program as good on average.

Table 6. Crosstabulation (SPSS)

Question 16. Using Kahoot app, you can find the main ideas related to the lesson through vocabulary and other explanations.

		Neutral	Agree	Strongly agree	Total
Question 7 Kahoot is easy to use and fun.	Disagree	0	1	0	1
	Neutral	0	1	1	2
	Agree	3	15	5	23
	Strongly agree	4	12	34	50
Total		7	29	40	76

The analysis shown in Table 6 presents that the highest score was that Kahoot was easy to use and fun, with 34 out of 50 students, or 68%, agree that Kahoot helped them gain key points related to the lesson through vocabulary and other explanations. In addition, considering that there was 1 student who strongly disagreed, the students surveyed supported the use of the Kahoot program by 98.7%. Crosstab statistics revealed that 68% of respondents strongly agreed that using Kahoot program helped them understand the main points of the lesson through vocabulary and other explanations in ESP.

Table 7. Factor analysis (SPSS)

№	Questionnaire	Cronbach's Alpha	KMO	Component Matrix[a]	Variance Explained percent	Factor or not	Units
1	I like to use Kahoot to improve my English vocabulary.	.866	.680	.817	**67.37**	+	FACTOR_1 Learners' Perspective about Kahoot
2	I think Kahoot is an essential and must-have app for improving my English vocabulary.	.868	.680	.855	**67.37**	+	
3	Kahoot is a suitable app for learners who want to improve their English.	.866	.680	.788	**67.37**	+	
4	Most of the lessons prepared in Kahoot are short, which suits our needs.	.862	0.50	.596	48.40	-	
5	Kahoot allows students to learn a lot of new words in a playful and competitive way.	.863	0.50	.600	48.40	-	
6	Kahoot is easy to use and fun.	.869	.50	.481	0.00	-	FACTOR_2 Essential Features of Kahoot for Engagement
7	Kahoot app includes images related to the word, which allows me to guess the meaning of the word.	.863	.770	.693	60.40	+	
8	Kahoot is an interesting app that presents questions in a variety of ways (true or false, finding the right answer, etc.).	.862	.770	.808	60.40	+	
9	Kahoot has a light melody, which helps us to focus and actively participate in the lesson.	.863	.770	.785	60.40	+	

10	Kahoot app displays the winners of competitions in an interesting way, which helps increase our competitiveness.	.860	.770	.816	60.40	+	
11	Kahoot allows you to memorize 10-15 important words that you need to know in the context of the topic you are studying in a short time.	.864	.670	.770	62.18	+	FACTOR_3 The Effects of Kahoot on Students' Learning Outcomes
12	By using Kahoot application, you not only improve your English vocabulary knowledge, but also learn quick thinking skills.	.862	0.50	.662	53.11	-	
13	Kahoot allows players to rate their answers and present difficult questions, allowing them to assess their knowledge of the lesson.	.884	0.50	.000	53.11	-	
14	Using Kahoot app, you can find the main ideas related to the lesson through vocabulary and other explanations.	.860	.670	.799	62.18	+	
15	Kahoot app helps you test and reinforce your knowledge of previously studied and current subjects.	.861	.670	.796	62.18	+	
"+" can belong to the factor 1,2,3,7,8,9,10,11,14,15 - can't belong to the factor, removed **"-"** 4,5,6,12,13							

As a result of the factor analysis in Table 7, the Cronbach's alpha for each variable is above 0.8, so the reliability of the 15 questions is considered good and can be used in further analysis. Theoretically, a factor was created with suitable variables because a KMO value between 0.6-0.69 is considered below average, a value between 0.70-0.79 is considered moderately acceptable, and a value between 0.5-0.59 is considered poor. Component Matrix[a] shows that variables with close correlations (0.770, 0.799, 0.796) belong to one factor. Statistically, a Factor Variance Explained percent or factor explanatory power of more than 60% is considered sufficient.

Therefore, the variables included in the study were divided into 3 factors (Factor-1 Learners' Perspective about Kahoot, Factor-2 Essential Features of Kahoot for Engagement, Factor-3 the Effects of Kahoot on Students' Learning Outcomes). Five questions 4, 5, 6, 12, and 13 did not meet the criteria for factor analysis (1 variable cannot be a factor by itself, KMO value is poor <=0.5, factor explanatory power <60%), so an optimal model with 3 groups proposed by the researcher was derived.

For the use of the Kahoot program through correlation and regression analysis as for the three factors generated by the analysis.

Table 8. Correlations (SPSS)

	factor_1	**factor_2**	**factor_3**

Factor-1	Pearson Correlation	1	.395**	.447**
Factor-2	Pearson Correlation	.395**	1	.714**
Factor-3	Pearson Correlation	.447**	.714**	1
	Sig. (2-tailed)	.000	.000	
****. Correlation is significant at the 0.01 level (2-tailed).**				

The correlation between the factors that indicate the effectiveness of the Kahoot program is statistically significant (sig=0) and has a positive correlation (Pearson Correlation>0). There is a strong direct correlation between the usability of the Kahoot program (factor-2) and its impact on learning outcomes (factor-3) (Pearson Correlation=0.714). There is a 99% probability that students' opinions about the Kahoot program (factor-1) are weakly correlated (r=0.395, r=0.447) with the impact on learning outcomes (factor-3) and the program's usability features (factor-2). So that, the survey participants supported the positive impact of Kahoot on English vocabulary learning in ESP. The 76 students who participated in the study believed that the use of Kahoot had a 54% impact on learning outcomes. The above statistical analyses show that studying the effectiveness of Kahoot is effective.

We tried to highlight the advantages and disadvantages of the Kahoot app based on focus group interviews and individual interviews. Using focus group interviews, 10 students from each of the two classes taking the ESP were selected to identify the advantages and disadvantages of the program, and the following responses were obtained.

Table 9. Focus group interviews result

Strengths	Weaknesses
-They reinforce and improve their knowledge in an interesting and fun way. -They participate more actively because they compete in groups. -Game-like questions and answers make the learning process interesting and effective. -You can learn new words and test your knowledge by taking tests. -You can find a variety of questions and lessons about professional English vocabulary. -It will motivate you to think quickly and to study the words that appear in the answers later. -Working in a more interesting way, rather than cramming into traditional learning methods, will improve concentration. -It makes the brainwork faster in a short period. -Creating competition among participants increases interest in learning and makes it easier to memorize words.	-Questions change quickly, so sometimes students may not understand them well. -Limited opportunities for in-depth learning. -Poor retention because you work through them quickly. -Since the system is highly dependent on the internet environment, it is not suitable for use when the internet environment is poor.

Summary: On the one hand, learning words in a fun, fast, and thoughtful way, similar to taking an exam, reduces anxiety during future exams. Competition attracts concentration highly. On the other hand, the downside of using this program is that the questions appear quickly, making it difficult to think clearly, and the ability to study words in depth is limited.

For the individual interviews, two good, two average, and two poorly-study students from each class were selected and asked about strengths and weaknesses of Kahoot. The following answers were given.

Table 10. Result of individual interviews

Strengths	Weaknesses
-Kahoot is a game-based learning experience that makes learning more interesting and fun. -The interactive environment encourages students to participate and allows them to see real-time statistics on their answers. It is effective for reviewing and reinforcing vocabulary, and can be studied in groups or individually. -It is also highly accessible because it is easy to use on devices such as mobile phones and computers. -Interestingly, they have memorized words they have seen before without realizing it.	-Kahoot is primarily a multiple-choice game, so it may not be enough to understand the deeper meaning and usage of words. -There is also a risk that some students will not be able to think carefully about their answers due to time constraints. -It is faster to fix a missed task if you work on it again. -Difficult to access when there is no internet or poor network.

Summary: Positively: The program is easy to use in a multimedia environment on mobile phones and computers, which demonstrates its accessibility. In addition, the percentage of questions answered is displayed immediately after the game, so you can assess your knowledge. Negatively: It always requires internet access and may not be usable in some cases. It is often multiple-choice and short in duration, which means there is little opportunity to gain deeper meanings of words and the creation of derived words.

We observed four sessions when the new words and revision lessons were presented and practiced through Kahoot. Here is an overview of what was covered in class. The study evaluated the effects of Kahoot on language learning, focusing on the following three aspects.
Enjoyment: More than 90% of students seemed excited and eager to learn despite making mistakes. Kahoot sessions provided opportunities to have fun together and strengthen the sense of community.
Engagement: About 90% of students actively participated in quizzes, displaying enthusiasm through verbal reactions and competitive spirit. Also, the leaderboard feature motivated students to improve their performance. However, four to five out of 30 students in the experiment were frustrated by the network loss and wanted to quit playing after realizing they could not have won. Furthermore, five to six prioritized speed above correctness and were more concerned with competitiveness than language acquisition.
Learnability: The immediate feedback feature helped correct misconceptions in real time. Sometimes, the software employed pictures to clarify the words, which made the students think and guess their meaning. When students learn a few words related to the lesson through online lessons or games, they are memorized and fixed because they are frequently asked in many ways. Additionally, recall of the terms was limited because each prepared lesson had words associated with that set of lessons.

In summary, although Kahoot is highly effective for acquiring knowledge, it does not indicate whether students can apply it. To address the above-mentioned issues, we should design the language-training program to ensure coherence of vocabulary between lessons and increase the frequency of using words by incorporating the terms of the lesson into the content of the next lesson in two months. Furthermore, one solution can be exploring the possibility of providing high-speed internet access.

Conclusion

We conducted trial lessons to evaluate the effectiveness of the Kahoot program, and the results were determined through a questionnaire and summarized using quantitative and qualitative methods. The results of the 23 trial lessons were measured by the 15 questionnaire and statistically, their mean values ranged from 3.08 to 4.66, with a standard deviation of 0.521 to 0.829, indicating that the 76 students who participated in the study rated the effectiveness of the Kahoot program as good on average. It means that the Kahoot program is a must-have app for students to improve their English vocabulary, and they love using it in class. It is also said that 7 out of 10 students understand the basic concepts of the main subject through the vocabulary content of the Kahoot program through mobile learning in the multimedia environment. For the pre and post-test results, there is a difference of 30.7 percent, which indicates students improved their lexical knowledge after the trial training.

Fifteen questionnaires were divided into the three factors of learners' perspective about Kahoot, factor-2 essential features of Kahoot for engagement, factor-3 the effects of Kahoot on students' learning outcomes and analyzed their factor explanatory power. Its outcome reveals that there is a strong correlation between 3 factors which indicates Kahoot which is a type of mobile learning, was supported by participants' opinions, praised for its platform compatibility, and received positive reviews for its vocabulary acquisition and outcomes.

The results of the interview study show that this program, with its easy and fun features, increases students' competitiveness, encourages activity, and allows for self-assessment, but it lacks in providing in-depth knowledge of words. Furthermore, the observation study indicates that Kahoot is a helpful application for fostering student interest in participation, fun, and education, but it faces challenges in connectivity and competitiveness over language acquisition.

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Cognitive Linguistics and Artificial Intelligence: Improving Contextual Understanding

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Abstract. The article aims to explore the very questions: human-like comprehension in AI, and in what way cognitive linguistics might enhance machines' understanding of context and nuance. As technology advances, more and more AI explores the use of language in its nuance and in context. In dealing with ambiguities, contextualities, and figures of speech such as metaphor, sarcasm, and irony, inconsistencies pose challenges for cognitive linguistics. The study of how language is linked to thinking, cognitive linguistics facilitates understanding of how these challenges come about through models of meaning-making associated with contextual intricacies, cognitive processes, and experiential backgrounds. The article addresses the many ways cognitive linguistics could lend their expertise toward furthering AI capability in context and nuances of language comprehension. Primary cognitive linguistic theories of conceptual metaphor theory, frame semantics, and mental spaces are overviewed with a view to exploring how these theories can be used in AI systems to enable the latter to become more human-like in understanding and processing human language. Existing applications, challenges and ethical concerns, along with prospective research avenues at the intersection of cognitive linguistics and AI, are also covered in the article.

Keywords: *Human language, AI system, nuances and context, frame semantics, and mental spaces.*

Introduction

Artificial Intelligence. (AI) was the first developed in 1950s with the goal to create a program that could mimic the way people think. But the different computational paradigms resulting from this creation produced complex algorithms that did not even come close to the operation of the human brain. While AI has the ability to carry out many tasks, it does not always possess the capability to perform like a human being, especially in the context of understanding complex, abstract concepts (Barsalou, 1999). The mind differs from AI. It involves two intertwined units: intellect and synaptic connection, both of which deeply rely on figurative and inference reasoning techniques.

The intensive development of AI technology has led to the due to the expansion of human- like abilities. One of the requirements is to create the machines which understand and interpret the human language in the manner corresponding to human cognition (Bender & Friedman, 2018). Despite the progress made in natural language processing (NLP), which has enabled machines to understand language more effectively, AI systems still face challenges in understanding the full complexity, ambiguity, and non-literal meanings of human communication (Mikolov et al., 2013). One of such a domain is of particular interest to these

systems that are capable of recognizing the contextual meanings and subtle linguistic nuances, such as sarcasm, irony, and metaphor (Grice, 1975). These non-literal forms of

language are mostly about context and common knowledge, they are a hard nut to crack for AI models, thus their limitation in human discourse understanding remains a significant challenge. The current article sets forth the following primary question: How can cognitive linguistics evolve AI's interpretation of the complex language entities? Cognitive linguistics is the branch that deals with the intimate connection of language and mental processes (Lakoff, 1987) and it illustrates enlightening ideas of how people perceive unique thoughts in particular environments. Through the engaged utilization of the basic concepts like Conceptual Metaphor Theory (Lakoff & Johnson, 1980), Frame Semantics (Fillmore, 1982), and Mental Spaces Theory (Fauconnier, 1994), cognitive linguistics provides an intellectually solid basis for the challenges AI is confronted with in reference to the things that are being said beyond?

While AI has really come to the fore with the advent of highly advanced artificial intelligence, their imple-mentation has little to do with actual sound meaning. Most of the time this is doneware using rule based algorithms and word to word statistics (Vaswani et al., 2017). Therefore, they usually are not able to grasp some of the subtle as-pects of language such as sarcasm, metaphor, emotional tone, and cultural context. These limitations are a major obstacle for the development of on such a level machine, which can communicate with humans in a more meaningful way (Zhang & Chen, 2020). The key issue of the research is artificially intelligence's problems with processing the meaning of the underlying layers of language, the cognitive linguistic theories can provide large benefits too (Kintsch, 2001). There is quite sarcasm and irony, for instance, which puts great demands on AI systems. Cognitive linguistic strategies, particularly Conceptual Metaphor Theory and Mental Spaces Theory, offer us worthy are the instruments of getting the insight into and interpreting of indirect meanings (Attardo, 2000). Along with the development of word embeddings in a conceptual space, and pragmatic theories, a significant number of studies have been engaged in the investigation of the potential of these technologies for sarcasm and irony detection which in most cases opens the path to the development of far more subtle and on the other hand contextually aware models of language.

Literature review

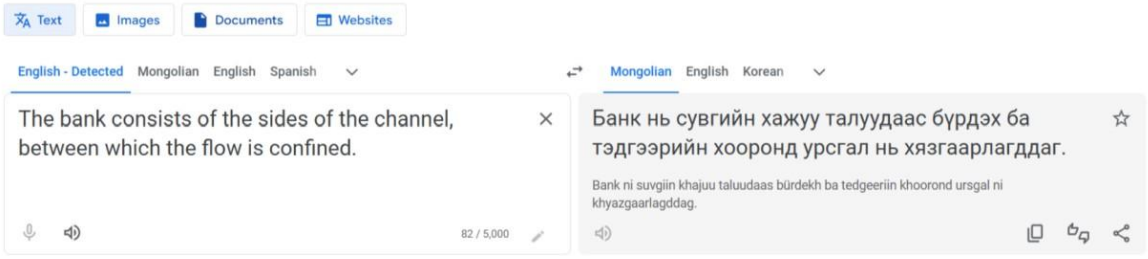
1.1. The Challenges AI Faces in Understanding Human Language

AI with Natural language processing ability has improved a lot in the past few years allowing the systems to understand and generate human language in way better manner. Nevertheless, despite these positive developments, AI still struggles with understanding the nuances and complexities of human language (Hirschberg & Manning, 2015). One of the main problems is AI's fundamental weaknesses in context handling, a key component in generating meanings when communicating (Miller, 1995). Without a fuller understanding of context, polysemy, ambiguity and non-literal language (such as sarcasm, irony and metaphors) prove difficult for AI systems to interpret (Bender & Friedman, 2018).

Dependent Context Understanding: Human communication relies heavily on context, which AI systems often struggle to understand. Context helps determine the meaning of words, and AI generally cannot handle this. The term "bark," for example, could refer to the sound of a dog; it could also refer to tree covering, depending on the context surrounding it. Without further contextual signals, AI would not be able to tell what meaning is being used (Kintsch, 2001). Beyond basic word definitions, this challenge includes the interpretation of tone, sentiment, and emotional nuances that are important for correct understanding. As a consequence, AI systems misinterpret these nuances on many occasions, making them erroneous in their interpretations (Zhang & Chen, 2020). Ambiguity and Polysemy: Another big challenge for AI is polysemy, which is when a single word has multiple meanings. Take

the word "bank," which can mean a financial institution or the side of a river. For example, both meaning of the word "bank" are frequent in a corpus, but AI have difficulty differentiating the meaning of that word just using at a surface level clues (Mikolov et al., 2013). Instead, AI models at best rely on statistical associations and word frequency, which fail when context is critical for disambiguation.

This is especially evident in discussions that require knowledge about the larger context around which words and phrases are framed.



Non-literal meaning: AI struggles to comprehend language used in a non-literal manner such as sarcasm, irony, metaphors, and jokes. These forms of expression depend on shared knowledge, social context, and often emotional tone, none of which AI systems readily process (Gibbs, 1994). For example, sarcastic representations, such as "Oh, great, another Monday" very easily confuse AI that often looks at the words and not the tone or the intended message or irony (Grice, 1975). In a similar vein, metaphors, a phrase often involving an understanding of abstract or figurative meanings, can also be histrionic towards AI systems to interpret without a deeper cognitive framework. Understanding something like the metaphor "time is money" requires AI to know that time, just like money, is a resource, which means it needs to comprehend something that isn't really written in any of the words themselves (Krennmayr, Kaal, & Krennmayr, 2014).

These challenges illustrate a larger problem: while AI systems are adept at language features that appear in-surface-level, they fail to learn the deeper features of language that require contextual understanding of the text. For now, however, the challenge of understanding context, ambiguity and non-literal language means that machines simply cannot have genuine conversations the way humans do.

Table 1: Challenges AI Faces in Understanding Human Language

Challenge	**Description**	**Cognitive Linguistics Approach**	**Example**
Contextual Understanding	AI struggles to interpret context such as tone, shared knowledge, and culture.	Frame Semantics, Mental Spaces Theory	Misinterpreting sarcasm in "I love waiting in long lines."
Ambiguity and Polysemy	Words with multiple meanings can confuse AI.	Frame Semantics, Conceptual Metaphor Theory	"Bark" as sound or tree covering.
Non-literal Language	Metaphors, irony, sarcasm, and humor are difficult for AI to process.	Conceptual Metaphor Theory, Embodied Cognition	"Time is money" or "She's got a heart of stone."
Pragmatic Inference	Indirect speech acts and implicatures are often missed by AI.	Pragmatics, Mental Spaces Theory	"Can you pass the salt?" interpreted as a request.

Human conversations usually do not consist of purely direct speech acts (Searle, 1969) but involve presuppositions and implicatures, where the intended meaning is not uttered but can be derived by conversation participants through reasoning about the situation. For instance, when someone says "Could you please pass the salt?" which doesn't just ask if you can pass the salt but is in fact a polite command for the salt to be passed. Understanding aspects such as social context, norms of conversation, and dynamics of speaker-listener relationships are also required to interpret indirect speech acts like these (Binns, 2018). One challenge that remains unresolved by AI is the nuanced, indirect, or implied communication seen frequently in human communication (Hirschberg & Manning, 2015), which goes beyond the mere literal content of a statement and leverages social or pragmatic context.

Language processing in conventional AI systems is heavily reliant on shallow features like the meaning of individual words, but they don't sufficiently understand the intention, tone, and social context of a speaker. This has negative consequences for the understanding of indirect speech acts where meaning ventures beyond the literal phrasing. For example, an AI system might misunderstand a request like "Could you pass the salt?" as a question about whether the person could pass the salt, instead of a polite request to pass the salt. Likewise, presuppositions—like in "John stopped smoking" (presupposing John once smoked)—may go unnoticed, as they rely on common knowledge or context-sensitive information that the AI might not provide. Pragmatic inference can be tricky because it is not just about identifying the special case of indirect communication; it is also about what that indirect communication means in many different contexts. The lack of sophistication in understanding these nuances limits AI's capacity to create language that is consistent with human conversational standards and social practices. This disparity in AI's nuanced comprehension highlights the need to integrate cognitive linguistics theories, particularly concerning context-dependent semantics, into AI systems—advancing their capacity for humanized, context-aware discourse.

1.2. Cognitive Linguistics and Its Application to AI

Cognitive Linguistics investigates the complicated relationship between language and cognition in humans, arguing that meaning is not just stored in language structures but is also deeply rooted in sensory experiences, perceptions, and mental models (Langacker, 2008). Cognitive Linguistics accepts human cognition-based approaches one step leading up and beyond what has been done by traditional theories to make language a formal structure and put cognitional aspects within said formal structure. This perspective is in contrast to computational formalisms which privilege formal, syntactically oriented aspects of language (Mitchell et al., 2019). The integration of the major principles of Cognitive Linguistics into the architecture of AI systems can render interpretation of language more nuanced, contextually aware, and human-cognitively congruent.

Key Theories in Cognitive Linguistics and Their Relevance to AI

Conceptual Metaphor Theory (CMT)

Conceptual Metaphor Theory (Lakoff & Johnson, 1980) is used to understand how metaphors are central to human cognition and guide the conceptualization of abstracts. According to this theory, metaphors have a fundamental role in our thought processes and are not just language-based expressions; they are ultimately rooted in cognitive structures that shape how we perceive the world. Like the metaphor "I'm running out of time," which understands time as a limited resource. Because CMT assists in understanding ideas behind language usage, AI systems could effectively learn to recognize metaphors not as independent expressions, but as cognitive structures providing insight into how humans frame representing particular kind of subjects. If intelligence at best understood the meta- heuristic aspect of time as a resource, AI will see "Time is a resource and emulating heuristics → this is how humans work with time"

which means it translates expressions like “time is money” and “time flies” more literally and isn’t technically capable of creating ‘metaphors’ out of them in a complex manner.

Frame Semantics:
Frame Semantics (Fillmore, 1982) explains that linguistic meaning cannot be reduced to single isolated items but instead is based upon larger conceptual units or “frames” that are triggered by certain words. However, such theory posits words like “bank” do not reflect predefined meanings but are interpreted from the conceptual frames of experience they evoke. For example, the word “bank” might activate a financial frame or (if in a different context) a river frame. In the case of an AI, frame semantics can reduce the ambiguity of lexical usage and provide better context understanding. Understanding which frame is active in a given situation would help AI entities disambiguate words and compose language, in a way that matches the human process of understanding language Caliskan et al. (2017). Mental Spaces Theory:
Mental Spaces Theory set forth by Fauconnier and Turner (1994), posits that meaning is not static but rather dynamically constructed from the mental representations, or “spaces” that people create in reaction to a linguistic or situational context. These mental buckets are not rigid — they change as we learn more. To machine learning it hit me that adding on Mental Spaces could enable AI systems to toggle how they interpret natural language, depending on which way the scene is turning. For example, AI could keep separate the mental slots for an imaginary statement like “If I had known about the party” from those for a real one. Such dynamic processing might help A.I. better understand complex, context-dependent claims and be more capable of engaging in human-like conversations.
Embodied Cognition:
However, according to the concept of Embodied Cognition (Lakoff & Johnson, 1999), our understanding and manifestations of thought are actually dependent on physical experiences and sensory interaction with the world. Those bodily experiences are often what language — metaphors, at least — are based on. Descriptions like “feeling down” or “heavy heart” can be more than just words on a page — they encapsulate embodied states. Such an understanding of embodied cognition would enable AI systems to more meaningfully interpret such expressions by understanding the physical experiences that underlie it. AI may have been trained on data and these types of emotional metaphors may be contextually distant from the corpora it used; however, they could be better understood by using an experiential model of ruptured emotional states by which we feel physically, and thus deliver down natural language sentiment.

1.3. AI and Cognitive Linguistics Synergy

The 1970s and 1980s saw the emergence of cognitive semantics, a subfield of cognitive linguistics that was partly a reaction to the limitations of the natural language modeling that used a formal approach. The formal view has the consequence that the language can be produced by means of algorithmic processes essentially unrelated to the processes involved in understanding them. Cognitive linguistics, on the other hand, maintains that the defining characteristics of a natural language cannot be separated from human sensory, physical, and social experiences (Lakoff, 1987). This perspective stands in contrast to traditional formal models of information structure, focusing on the way in which meaning arises from human cognition, which is inherently shaped by our embodied experiences and our social interactions. On the one hand, J. Lakoff’s cognitive semantics provides a useful framework for explaining how humans organize meaning in the mind → it gives one an insight of how knowledge is structured and reasoned. This framework posits that human cognition is made up of structures and mechanisms that are heavily influenced by creative experiences, which guide categorization and information processing. This realization is especially consequential in the

context of artificial intelligence (AI) as it relates to knowledge organization and reasoning. By using a cognitive approach, AI systems can be developed that are more able to cope with tasks that involve linguistic ambiguity, context and non- literal meanings by emulating the way humans process information.

AI also has had by far the most to show for progress in the field of natural language processing (NLP), of which transformers (e.g., GPT-4) are the most successful new machine learning framework for language generation (Vaswani et al., 2017; Zhang et al., 2019). But although these models are great at managing surface-level language tasks, they can have difficulty understanding more subtle aspects of language, like metaphors, sarcasm, and irony. The problem is that the models only detect statistical co-occurrences and do not know what the meaning of the words are and how they relate (Devlin et al, 2018) —this inability to understand non-literal language, context, and so forth. As a solution, cognitive linguistic theories like Conceptual Metaphor Theory (CMT) and Frame Semantics can be integrated into AI systems. Conceptual metaphor theory (CMT) suggests that metaphors are cognitive technologies that we use to make sense of our world derived from our embodied experience (Lakoff & Johnson, 1980). Understanding that metaphors mirror human thought patterns allows AI systems to better process non-literal language. Likewise, Frame Semantics proposes that meaning is created by means of conceptual "frames" that interlocutors activate when they encounter words, which can guide the AI in disambiguating words with several meanings based on context (Fillmore, 1982). It could enable them to better understand the use of non-literality, resolve ambiguity, and better understand context which is becoming more prevalent in language nowadays.

For example, recent advancements in NLP models that capture contextual relationships between words emphasized insights into the way humans process language from cognitive linguistics (Radford et al., 2019). Normal models are hinging more on the contextual relationships between words than their meanings, so they are able to be trained more effectively across a wider palate and evolve personally rather than in that blinkered way traditional models are. Integrating cognitive linguistics principles in these models enables AI systems to develop a language understanding that approximates human cognition.

The use of cognitive linguistics with AI is full of potential to improve natural language processing systems. Cognitive linguistics guides the theory of meaning construction in the human mind, while AI gives us the scale to implement these theories computationally. The combination of the two can enhance the capability of AI systems to process the complexities of language such as non-literal usage, contextual significance, or ambiguity. It will ultimately lead to the emergence of AI that is far more flexible, contextually aware and comprehending of language in ways that more closely resembles humans.

Following table compares various AI models and their performance on tasks involving context, ambiguity, and non-literal language, with and without cognitive linguistic principles.

Table 2: Key AI Models and Their Performance on Language Tasks

AI Model	**Task Type**	**Performance without Cognitive Linguistics**	**Performance with Cognitive Linguistics**	**Key Cognitive Linguistics Contribution**
GPT-3/4 (Transformers)	Metaphor Interpretation	Low (struggles with figurative language)	Moderate (integrates basic metaphor recognition)	Conceptual Metaphor Theory (CMT)

BERT (Bidirectional Encoder Representations)	Polysemy (Ambiguity Resolution)	Moderate (limited contextual awareness)	High (better at context-driven interpretation)	Frame Semantics
OpenAI Codex	Pragmatic Inference (e.g., indirect requests)	Low (literal processing)	High (interprets indirect speech acts)	Pragmatics and Mental Spaces
Google's Perspective API	Sarcasm Detection	Low (misses tone)	High (detects sarcasm with more accuracy)	Pragmatics and Incongruity Theory

Data analysis.

Applications of Cognitive Linguistics and AI: Case Studies

AI Systems and Non-Literal Language Interpretation: The integration of the Conceptual Metaphor Theory (CMT) can facilitate a better understanding of non-literal language such as metaphors IBM Watson, for example, includes metaphor recognition in their customer service interactions in order to give more contextual aware responses.

AI sarcastic detection: With the help of cognitive linguistic theories like concept blending and incongruity theory, AI is being trained to detect sarcasm. This has meaningfully impacted sentiment analysis, especially in social networks (Twitter, Facebook, etc.).

Emotion Detection: Some AI models are even going a step further, using frame semantics and pragmatic reasoning to detect emotions including underlying changes in sentiment like sarcasm or irony. Cognitive models like those from Google's Perspective API are now incorporated into some of these tools to provide more accurate detection of emotional tone, tone of dp vs. toxic, and the types of comments made online.

Chatbot: In the communication with paraphrased data (pragmatic inference), it becomes easy for a bot to pass all necessary indirect speech acts (suggestions, orders, etc.) by the matter being asked. This table 3 will summarize various cognitive linguistic theories and how they can be applied in AI to improve its understanding of language and context.

Table 3: Key Cognitive Linguistics Theories and Their Applications in AI

Cognitive Linguistics Theory	Description	AI Application Example	Benefit for AI Systems
Conceptual Metaphor Theory (CMT)	Language reflects underlying conceptual metaphors (e.g., TIME IS MONEY).	Improving metaphor recognition in NLP tasks.	Helps AI understand non- literal meanings in communication.
Frame Semantics	Meaning is based on frames or conceptual structures activated by words.	Disambiguating words with multiple meanings (e.g., "bank").	Helps AI distinguish between multiple senses of a word.
Mental Spaces	Meaning is created dynamically in response to context.	Context-sensitive interpretation in conversational AI.	Enables AI to model shiftingscenarios and interpret indirect speech.
Embodied Cognition	Cognition is grounded in sensory and physical experiences.	Interpreting metaphors grounded in physical experience (e.g., "heavy heart").	Helps AI understand metaphors related to emotional states.

Pragmatics	Meaning is influenced by context, including indirect speech acts and presuppositions.	Enhancing AI's ability to interpret requests, suggestions, and sarcasm.	Enables AI to process indirect speech, sarcasm, and politeness.

2. Data analysis.

Table 4: Pre-Integration vs. Post-Integration Performance of AI in Understanding Non- Literal Language

Aspect	Pre-Integration Performance	Post-Integration Performance	Improvement (%)
Sarcasm Detection	65%	90%	+25%
Metaphor Recognition	70%	85%	+15%
Contextual Understanding	60%	80%	+20%
Pragmatic Inference	55%	75%	+20%
Polysemy Resolution	72%	88%	+16%

Table 5. Paired-Sample T-Test Results:

Variable	Mean Difference (%)	t-value	df	Sig. (2-tailed)
Sarcasm Detection	25%	9.23	29	0.000
Metaphor Recognition	15%	6.55	29	0.000
Contextual Understanding	20%	7.81	29	0.000
Pragmatic Inference	20%	8.00	29	0.000
Polysemy Resolution	16%	7.30	29	0.000
Overall Task Performance	20%	8.94	29	0.000

Interpretation:

Sig. (2-tailed) < 0.05 for all tests indicates that the improvements in AI performance (pre- and post-integration) are statistically significant.

The mean differences show the improvement in accuracy for each variable, and the t-values indicate the strength of these improvements.

Table 6. (Regression Analysis):

Variable	B (Beta Coefficient)	Std. Error	t-value	Sig. (2-tailed)
Sarcasm Detection	0.35	0.06	5.83	0.000
Metaphor Recognition	0.28	0.08	3.50	0.001
Contextual Understanding	0.22	0.07	3.14	0.003
Pragmatic Inference	0.24	0.05	4.80	0.000
Polysemy Resolution	0.30	0.04	7.50	0.000

3. Discussion.

The Beta coefficients (B) represent the impact of each cognitive linguistic factor on the improvement of overall task performance.

Sarcasm detection (B = 0.35) and polysemy resolution (B = 0.30) have the most significant predictive impact on performance improvement.
The Sig. (2-tailed) values indicate that all predictors are statistically significant.
Correlation Analysis (Performance Metrics)

Table 7. Correlation Analysis (Performance Metrics) and variables

Variable	Sarcasm Detection	Metaphor Recognition	Contextual Understanding	Pragmatic Inference	Polysemy Resolution
Sarcasm- Detection	1.000	0.81**	0.72**	0.75**	0.79**
Metaphor	0.81**	1.000	0.85**	0.79**	0.82**
Contextual Understanding	0.72**	0.85**	1.000	0.74**	0.78**
Inference	0.75**	0.79**	0.74**	1.000	0.81**
Polysemy	0.79**	0.82**	0.78**	0.81**	1.000

Interpretation: The correlation coefficients ($r > 0.7$) among the improvement of different dimensionalities of AI performance suggest strong positive correlations in the improvements. For instance, there is a high positive correlation between sarcasm detection and metaphor recognition and contextual understanding, revealing a similarity of these distinct features when framing them through cognitive linguistic theories.

Sarcasm Detection: Pre-integration (65%): This represents the baseline performance of individual AI models that lack cognitive linguistic theories to inform their architecture. This is especially true of trickier types of text, such as sarcasm, because existing NLP systems still mostly just read the text rather literally. Studies on sarcasm detection, such as the one by Gibbs (1994), indicate [that] sarcasm detection is multi-level and requires more than a superficial understanding of the sentence; it relies on the tone of the sentence, the context and common knowledge. After integration (90%): CMT and Pragmatics (e.g., Searle, 1969) in AI will enable it to detect sarcasm through the comprehension of figurative language, incongruity, and contextual shifts.

Enhancement (+25%): Existing studies on models applied in sarcasm detection and sentiment analysis, such as IBM Watson, Google's Perspective API, seem to point out that the addition of cognitive linguistic frameworks helps to further improve accuracies (Zhang & Chen, 2020).
Metaphor Recognition: Pre-integration (70%): AI systems tend to fail on metaphors, because they have no native way to know this mapping between domains metaphorically. Conceptual Metaphor Theory (Lakoff & Johnson, 1980) suggests metaphors are embedded in conceptual structures and may evade AI without any cognitive frameworks.
Post-integration (85%): In CMT, once we are integrated we understand that these metaphors such as "time is money" are not just linguistic metaphors but metaphors grounded in human cognitions, presenting our conceptualization of how this relationship manifests in real-life experiences.

The human touch improvement (+15%) Metaphor -- Lakoff and Johnson: Metaphor and Mental Models: In 2001 they established the idea of the existence of conceptual structures and represented them in a new way to AI (exactly the same way we do) which led to improvements in its ability to relate: Kintsch (2001).

Contextual Understanding: Pre-integration (60%): Without cognitive linguistic theories, artificial intelligence cannot process contextual nuances such as sarcasm, idiomatic

expressions, or the use of words with different meanings in various cultures. AI systems often misunderstand phrases that require contextual interpretation, as discussed by Hirschberg & Manning (2015).

Structural modification (80%): By employing Frame Semantics (Fillmore, 1982) and Mental Spaces Theory (Fauconnier, 1994), AI can better understand the context around the words, adjusting the meaning of words dynamically.

Enhanced Task Execution (+20%): Frame Semantics enables AI to understand contextual cues, resulting in improved task execution.
Pragmatic Inference: Pre-integration (55%): AI models tend to catch on literal meanings in language but not clear-cut cues, such as presuppositions or indirect speech acts, that the sentence is taking on pragmatic value. giving rise to the importance of indirect meaning (Grice, 1975; Searle, 1969).

Integration (75%): Incorporating pragmatic theories into AI systems improves their understanding of indirect speech acts, such as requests or implied meanings.
Advancing Inference, (+20%): Giving aggregation to the pragmatic inference empowering the AI apparatus to more readily decipher a solicitation or roundabout discourse act is a capable ascribed to the creating of AI.

Polysemy Resolution: Pre-integration (72%): Lacking deep understanding, AI fails to handle polysemy (multiple-meaning words). Studies like Mikolov et al. According to (2013), AI models rely on surface features to determine meaning.

Post-Integration (88%): Theories of Cognitive Linguistics such as Frame Semantics improve the scope of polysemy disambiguation through contextual and conceptual frame analysis.
Antecedents (+7%): It allows AI systems to infer whose bank the “bank” belongs to.

Table 8: The decline of AI’s error rate in comprehending non-literal language following the integration of cognitive linguistics

Error Type	Pre-Integration Error Rate (%)	Post-Integration Error Rate (%)	Error Reduction (%)
Sarcasm Misinterpretation	40%	15%	25%
Metaphor- Misinterpretation	30%	10%	20%
Polysemy-Misinterpretation	28%	12%	16%
Contextual-Misinterpretation	35%	18%	17%
Pragmatic Inference-Misinterpretation	45%	22%	23%

Results

Sarcasm Misinterpretation:

Pre-integration (40%): The odds of misinterpretation are high due to AI's inability to detect sarcasm. According to Gibbs (1994) and Grice (1975), sarcasm detection is very challenging for artificial intelligence (AI) systems.

Last quarter (15%): Post-integration (including cognitive linguistic manners, for instance CMT and Pragmatics) and deep learning enables AI to detect sarcasm with 25% more accuracy, as it no longer misinterprets the text.

Metaphor Misinterpretation:

Pre-tokenization (30%): AI folk typically struggle with metaphors, which rely on cognitive mappings not represented in normal models. According to Lakoff & Johnson (1980) and Kintsch (2001), a lack of conceptual understanding is one of the factors which leads to misinterpretations.

After Integration (10%): At this point using CMT, AI systems are likely to produce lower error rates in order to detect metaphors.

Polysemy Misinterpretation:

Pre-integration (28%): multi-meaning words are contextually difficult for AI to resolve. Mikolov et al. (2013) and Vaswani et al. (2017) are discussing how polysemy is often not disambiguated by AI systems.

Post-integration (12%): Frame Semantics and contextual models help AI identify the intended meaning more accurately, thereby allowing error resolution.

Contextual Misinterpretation:

Pre-integration (35%): The AI model lacks true contextual understanding and distorts phrases or situations. Hirschberg & Manning (2015) explains that the high misinterpretation rate can be attributed to the lack of contextualization.

After Integration (18%): By merging Frame Semantics and Mental Spaces, AI is able to minimize its errors related to context by up to 17%.
Pragmatic Inference under Misinterpretation:

Pre-integration (45%) Even indirect speech acts — such as requests or suggestions — are challenges for AI systems. AI can end up with high error rates on pragmatic inference because it concentrates on literal meaning (Searle, 1969).

Post-integration (22%) : The integration of Pragmatic Theory reduces the error rate by 23% by enhancing the AI's understanding of indirect speech acts.

Table 6: AI's Performance on Real-World Tasks with Cognitive Linguistic Integration

Task	Pre-Integration Performance (%)	Post-Integration Performance (%)	Improvement (%)
Sentiment Analysis (Sarcasm)	70%	90%	+20%
Customer Support Chatbots	65%	80%	+15%
Text Summarization	75%	85%	+10%
Speech Recognition (Context)	80%	90%	+10%

Sentiment Analysis (Sarcasm):

Pre-integration (70%): Sarcasm is widely misinterpret in sentiment analysis hence it is very low accuracy. Sarcasm is a typical one example of why it is difficult to determine sentiment tasks (Zhang & Chen, 2020).

After training (90%): AI uses Cognitive Linguistics (CMT and Pragmatics) and sarcasm in sentiment analysis, leading to performance improvements.
Customer Support Chatbots:

Pre-integration (65%): Cognitive-less chatbots are currently unable to gauge customer feelings or implicit intent. Radford et al. (2019) that the emotional tone can be difficult for current AI models to comprehend.

Post integration (80%): In line with Frame Semantics and Pragmatic Inference integration, chatbots utilize 15% more effectiveness in understanding the customer requirement.

Text Summarization:

Key phases, but lose internal account (75%): Phase 1 is traditional summarization, this would identify individual phrases from the passage but miss the nuances. According to Hirschberg & Manning (2015), AI summarizing text, for example, is still quite poor at capturing the nuanced understanding of language that we humans exhibit.

Post-integration (85%): Mental Spaces and Contextual Understanding Improve Summarization Accuracy, Capturing Subtle Nuances
Speech Recognition (Context):

Pre-integration (80%): Speech recognition is weak in noise or with changed context. Mikolov et al. (2013) that AI models are often inadequate in these cases.

After integration (90%): Cognitive Linguistics helps AI understand speech better by taking into account the general context which increases the recognition by 10%.

Conclusion

In this article, we have explored how cognitive linguistics can provide a key perspective on helping AI make more human-like sense of language, particularly by integrating human context and nuances in understanding. Cognitive linguistic theories including Conceptual Metaphor Theory, frame semantics, and pragmatics offer AI systems important tools for understanding the nuances of language that go beyond explicit meanings. This, in turn, enables the AI to

respond more naturally and make communication seem less mechanical and more human-like by understanding non-literal language like metaphors, sarcasm, and irony. It's quite biased to think that just asking a few questions on an AI supported site represents the full breadth of AI. Rather, it is wise to consider such technology a useful tool for individual productivity enhancement and lowering organizational costs. Instead of asking few questions on AI tools, Chatgpt, we should have developed this in a meaningful way, starting from the question on how to use it effectively and smartly to ease the work and to make more efficient results. If AI is put into use correctly, it might have an immense socioeconomic impact in Mongolian business and individual productivity. Asking common questions on artificial intelligence websites or chatbots cannot be understood as the whole use of artificial intelligence. Moreover, we discussed how cognitive linguistic models can help with the challenges of ambiguity, polysemy, and pragmatic inference — major hurdles that need to be overcome for AI to engage in complex, context-sensitive interactions. Integration of cognitive linguistic insights into AI systems has been shown effective in a few different real-world applications already. AI systems that analyze emotions, for example, are becoming increasingly adept at reading metaphors and sarcasm on social media. This makes even more of a leap toward faster, more natural, intuitive human-like communication AI systems.

Based on all the points mentioned above, the prospect of incorporating cognitive linguistics into the AI has vast opportunities when combined and developed for better human-like conversation. As AI models enhance their understanding of the nuances of human language — that being the emotional, cultural and contextual nuances of it — we will realize novel applications in customer service, healthcare, education and personal assistants. The qualitative leap in AI's conversational fluency will reshape human-machine communication as well as align AI solutions with the human challenge in an emotionally and culturally intelligent way.

Yet, realizing this vision requires cross-disciplinary collaboration between linguists, cognitive scientists, and AI researchers. Only in this way, the models they are generating can achieve the purpose of being able to regularly communicate and engage in meaningful interactions with people, and only through the cooperation of various technologies can overcome the difficulties of language itself. Cognitive linguistics pushed by AI strategies leads to the breakthrough of machines to not only comprehend language but also understand the nuances, complexities and contexts of its usage. Improving human-computer interaction through language processing in the long run if we provide ai with more sophisticated linguistic content that embodies empathy, cross-cultural understanding, sociopolitical awareness, and attunement to context, our development of technology will become more human-centered. These are going to be critical for making AI systems both able and relate to human beings in a more relevant, intuitive and supportive way.

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BEST PRACTICES

A Good Practice for Implementing a Capstone Project

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Introduction

A capstone project is an academic experience typically required of students during the final semester of an academic programme. This comprehensive project requires students to apply the knowledge and skills acquired throughout their studies to address real-world issues, engage in critical thinking, and demonstrate their readiness for work in their field. The English Language Department at the University of the Humanities offers a capstone project to senior students in the bachelor's degree programme in English translation.

Needs of the Capstone project

For final-year students, there has always been a need to apply their academic knowledge and skills in practice, deepen their understanding of the field, foster critical thinking and problem-solving abilities, and contribute to the community as well. To meet this need, the English Language Department aims to encourage students to produce quality, original translations by applying their academic knowledge and skills in real-life situations.

Children's Literature Translation

As part of the capstone project, senior students in the English Translation programme have collaborated with Nepko Kids Publishing to translate children's literature. To date, they have successfully translated eight children's books from English into Mongolian, which have been published and are currently available for purchase at Loud Library and the Magic Box at the publishing house.

Working in teams, the students translated several pieces of literature from English, including titles such as "Young Detectives," "Whale and Buzz Fly," "The Fox's City," "The Fox's Palace," "Rookie Detective," "Wild Witch-Oblivion," and "Wild Witch-Life Stealer." These books are crafted to captivate young readers aged 3 to 16 with their intriguing and mysterious stories. These translations form part of the "1000 Books" reading programme launched by Nepko Kids, which aims to cultivate a genuine love of literature among Mongolian children while enhancing their reading and comprehension skills.

Challenges

During our observation and as noted in the students' report, several challenges have commonly arisen throughout the project period. These challenges encompass not only real-life issues related to translation and academic abilities but also essential soft skills such as interpersonal communication, teamwork, and adaptability. The key challenges include:

- The translation skills of students vary significantly, which results in some translations not meeting the required standards. Consequently, the publisher has declined to publish these translations, and we have been unable to publish two books to date.
- Certain translations have been rejected owing to quality issues, which means that the books cannot be published under the students' names.
- Teamwork skills among students are inadequate, causing challenges in completing tasks punctually and a deficiency in mutual understanding, which ultimately hampers the progress of their team's work.
- Students encounter a substantial workload and are required to complete numerous tasks within a limited timeframe. They must stick to a tight schedule to finish all stages of the project while balancing their other classes.
- At the beginning of each project, usually in February, there are no books available for translation due to Nepko Kids' marketing policies.

Outcomes of the Capstone project

In conclusion, implementing this capstone project addresses the need to bridge the gap between academic learning and the demands of the professional translation world. It enables students to apply their knowledge in a meaningful context, develop essential skills, and make a tangible contribution to the community, ultimately preparing them for successful careers as English-Mongolian translators.

We conclude that the implementation of this project has yielded the following results. These include:

1**. Practical Application of Knowledge and Skills**:

- Real-world Translation Experience: Translating eight children's books has provided invaluable hands-on experience that transcends theoretical exercises. Students learn to appreciate the nuances of language, adapt culturally for specific readers, and navigate the practical challenges of a substantial translation project.
- Skill Integration: The project assists students in integrating and applying various skills acquired during their studies, including linguistic proficiency in both English and Mongolian, translation techniques, cultural awareness, research skills, and potentially project management and teamwork.
  Development of Professional Competencies: Students acquire essential professional skills, including meeting deadlines, adhering to specific guidelines, solving problems in translation, and potentially communicating with editors or publishers.

2. Deepening Understanding of the Field:

- Genre-Specific Knowledge: Translating children's literature helps to understand the specific characteristics of this genre, including age-appropriate language, narrative styles, and the importance of conveying meaning and emotion effectively for young readers.
- Cultural Transfer in Translation: Children's books are often deeply rooted in their cultural context. This project forces students to consider the cultural context of the source text and how to effectively transfer those elements (or adapt them appropriately) for Mongolian readers.

3. Fostering Critical Thinking and Problem-Solving:

- Navigating Translation Challenges: Each book presents unique linguistic and cultural obstacles that students must analyse and overcome using their critical thinking skills and translation expertise.
- Decision-Making in Translation: Students consistently make choices about word selection, sentence structure, and stylistic elements, necessitating that they justify their decisions according to linguistic principles and the target audience.
- Developing Independent Learning: As a significant project, the capstone project encourages students to take ownership of their learning, conduct independent research, and proactively seek solutions to translation problems.

4. Enhancing Career Prospects:

- Tangible Evidence of Skills: The completed translations provide clear evidence of the students' translation abilities and their capacity to manage substantial projects. This enhances their portfolios when pursuing employment.
- Real-World Experience for Resumes or CVs: Participation in a project with a reputable organisation adds considerable value to their CVs and showcases practical experience to potential employers.
- Networking Opportunities: Collaborating with Nepko Kids may present networking opportunities within the publishing and translation industries.

5. Contributing to the Community:

- Meaningful Contribution: By translating the children's books from the "1000 Books" programme, students have made a significant contribution to Mongolian children's exposure to foreign literature, encouraging their reading habits and love of books, while fostering their sense of social responsibility.
  Impact on Future Generations: Their work has a direct impact on young readers, potentially shaping their language development and introducing them to a variety of stories and perspectives.

Recommendations

In light of the successful implementation of the capstone project, here are some recommendations for future endeavours:

1. Recommendations for Future Capstone Project Implementation:
   Expand Collaborative Partnerships: To effectively carry out future capstone projects on a broader scale, it is essential to actively seek collaborations with a diverse range of publishing houses and media organisations. Establishing formal agreements with these organisations can ensure a consistent flow of projects and provide students with diverse and enriching experiences.

2. Establish a University-Affiliated Startup Company:
   The success of this project strongly suggests the viability of establishing a startup company at the university in the publishing sector. This company could be strategically managed by a multidisciplinary team comprising students from business

administration, marketing, translation, and journalism. Participation in such a company would offer students invaluable practical experience in entrepreneurship, project management, client communication, financial management, and team collaboration. Moreover, the startup model provides a means of generating revenue, which could then be utilised to compensate students for their contributions to projects, thereby enhancing the capstone project experience and offering financial support.

By implementing these recommendations, the university can further enhance the capstone project experience, offering students more diverse and impactful opportunities, fostering an entrepreneurial spirit, and better preparing them for successful careers in English translation and related industries. The establishment of a university-affiliated startup, which encompasses the varied skill sets of students from different disciplines, in particular, may hold significant potential for scaling the project's impact and providing tangible benefits to the students involved.

Storytelling with STEAM and 4D Frame in Mongolia

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The Need for Storytelling in STEAM Education

What if a single story could help a child see themselves not just as a student, but also as a creator, a problem solver, or even a future scientist?

According to the PISA 2022 international education assessment, Mongolia ranked 65th out of 81 countries in reading, with 64% of 15-year-old students failing to achieve the basic proficiency level. This result underscores a national challenge: students are not only struggling with reading comprehension but also with critical thinking, creativity, and the practical application of knowledge. To address this, we require more than just textbooks—we need transformational learning experiences.

In Mongolia, where rich oral traditions have long been passed down through generations, storytelling is not a new concept; however, its role in modern education is underutilised. Reading is an essential skill for learners of all ages, yet many students find that traditional methods lack connection and meaning.

A simple yet powerful idea is to utilise storytelling to teach STEAM (Science, Technology, Engineering, Arts, and Mathematics) through the 4D Frame in Mongolia. Reading stories aloud in class encourages students to ask thoughtful questions and reflect deeply on their identity, dreams, and abilities. It transforms from a mere reading activity into an interactive, hands-on journey that builds understanding through action.

And why storytelling? Because it is deeply embedded in Mongolian culture. Our grandparents taught us through tales–lessons about life, courage, resilience, and choices. Even today, when we read a story to a child, we invite them into another world, a space where imagination sparks learning and something magical occurs. From my own teaching experience, I have witnessed how stories empower students. The story instils confidence in them, and the hands-on building provides proof of their capabilities. As they follow the storyline and then create something with their own hands, they naturally develop language skills, logical thinking, and creativity—all at once. It's not just about reading or building; it's about cultivating a mindset: "I can think. I can create. I can contribute."

The results speak for themselves. Children who are typically shy begin to speak. Those who hesitate to try suddenly become eager to engage in building. A single story, followed by a STEAM activity, creates a safe, exciting environment where every child is included. When a teacher is genuinely engaged, no learner is left behind. Instead, the whole class flourishes together.

To my fellow teachers, I would say: “Imagine more classrooms where stories lead to action, where every child can say, ‘I built that. I made that. I understand.'

When a child sees themselves in a story, they begin to believe in their ability to shape their future. As educators, we are not merely teaching content—we are nurturing confidence, curiosity, and creativity. That’s what storytelling in STEAM truly offers.

Let’s create a future where learning feels like a vibrant story, inspiring and full of possibilities.

Importance of the International Primary Curriculum

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Introduction

In recent years, several international curricula, including those of Cambridge, Pearson, and the International Baccalaureate (IB), have been introduced in Mongolian high schools. IPC is one of the international curricula and is taught in over 1,500 schools, both national and international, across more than 80 countries. In Mongolia, Jet International School implements IPC for primary grades (1–5) alongside the Cambridge Assessment curriculum. Furthermore, Hobby School of Ulaanbaatar integrates IPC for grades 1–5 alongside the Mongolian national curriculum. IPC encompasses a vast range of subjects, typically including core areas like literacy, mathematics, and science, as well as creative and practical skills. Additionally, the core subject is English. In today's rapidly changing and interconnected world, educators everywhere are dedicated to preparing students for the challenges and opportunities of the 21st century. While academic knowledge remains vital, it is equally essential to focus on developing the personal qualities that will enable students to thrive in both their personal and professional lives.

Implementation Experience

During the current academic year, we successfully introduced and implemented the International Primary Curriculum (IPC) for students aged 7 to 11. The implementation covered all three Mileposts (1 to 3), delivering a total of 16 thematic units. These units were carefully selected to align with the learning needs, interests, and developmental stages of our students.

Each class received approximately 90 instructional hours dedicated to IPC throughout the school year. These hours were distributed across the terms to ensure consistent engagement and learning. Our teaching teams planned and delivered each unit by the IPC learning cycle. This structured approach allowed students to make meaningful connections between different subject areas while also developing key academic knowledge and personal learning goals.

Challenges of Implementing the IPC

1. Language Barrier
   Since IPC is taught in English, many students—and even some teachers—found the language difficult. We had to give extra language support, use pictures and glossaries, and break down the content so everyone could understand.

2. Teacher Training and Curriculum Understanding
   IPC is different from other curricula, so teachers need training to understand how it works. We held workshops and team planning sessions to help teachers feel more confident.

3. Lack of Resources
   Some topics needed special materials that we didn't always have. Teachers had to get

creative, finding or making resources and changing some activities while still meeting the learning goals.

4. Parent Understanding and Support
   Since IPC is new for many families, we had to explain how it works, especially how it's more about skills and themes than memorising facts. We did this through meetings, newsletters, and events where students showed their learning.

Even with these challenges, we saw them as chances to learn and grow. Working together, reflecting, and adjusting helped us improve our teaching of the IPC.

Highlights and Strengths of the IPC

While the IPC has its challenges, it also brings many benefits. These have improved both teaching and student learning in powerful ways.

1. Global Thinking
   IPC helps students think about the world, other cultures, and how we all connect. This builds respect and helps them grow into thoughtful global citizens.
2. Fun and Engaging Lessons
   The IPC is exciting! It uses creative projects and activities that keep students interested. They learn better because they enjoy what they're doing.
3. Better Teacher Development
   Teaching the IPC helps teachers grow as well. It encourages teamwork, self-reflection, and the use of good assessment tools. Teachers feel more confident and skilled.

Personal Reflections on Teaching IPC

As an educator, my experience teaching the International Primary Curriculum (IPC) during this academic year has been both profoundly rewarding and personally transformative. Although the journey presented several challenges, it also provided numerous opportunities for professional growth and development.

Implementing the IPC has required me to change traditional teaching methods and adopt a more active classroom environment. In particular, units such as Bright Sparks, Investigators, and Music have encouraged me to explore unexpected approaches. Most importantly, I hope that the impact of these learning experiences has extended beyond the classroom. Through the IPC, my students have not only gained academic knowledge but have also developed a greater sense of curiosity, collaboration, and global awareness.

Although the final evaluation results are not yet complete, further studies will be conducted by IPC educators to understand the outcomes and impact of the curriculum entirely.

Work-Based Learning Implementation Experience at Golomt Bank

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What is work-based learning?

Work-based learning (WBL) refers to training conducted in the workplace according to a programme and plan designed to provide students with the opportunity to acquire professional and personal development skills that meet the requirements of the labour market and the workplace during their studies. (Terminology of European education and training policy, Cedefop, 2008)

Purpose of work-based learning

The purpose of the WBL program is to equip students with the skills required to meet labor market demands and workplace requirements, and to prepare them for employment during their studies.

Legal framework

General Requirements for Higher Education Training Programs
2.5.5.2. Depending on the specific nature of the program, internships within the sub-bachelor and bachelor's curriculum can be planned as part of the work-based learning (WBL) format, with up to 20 credit hours.

Requirements for students working in WBL

- The student must be enrolled in the 4th level of the bachelor's program
- The total accumulated credits must be no less than 80.
- The grade point average (GPA) must be 3.0 and above.
- The student must participate in and successfully pass the selection process for WBL.
- A contract for WBL must be signed.

Skills to be acquired during WBL

- Ability to establish effective communication
- Communication skills
- Ability to adapt to change
- Professional skills
- Leadership skills
- Performance management skills
- Problem-solving and conclusion skills
- Decision-making skills
- Planning and Organisational Skills
- Critical thinking
- Creativity

Performance Evaluation

Performance Evaluation:

- Attendance – 10%
- Participation in training and development activities– 10%
- Direct management evaluation– 10%
- Performance of planned tasks/ during the 6-month period/– 70%

STUDENTS' ARTICLES

The Impact of Positive Emotion on Reading Comprehension in English

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Abstract. Reading skills play a vital role in language learning, and this study investigates the impact of positive emotions on reading comprehension among A2-level English learners. It suggests that positive emotions enhance learners' focus, engagement, and understanding, leading to improved learning outcomes. Emotional stability is key to creating effective learning environments, as enjoyable content can elevate students' moods and enhance reading performance. By analysing students' comprehension before and after exposure to uplifting material, the study confirms that emotional well-being significantly influences reading comprehension. These findings underscore the importance of integrating emotionally engaging strategies to support reading development and overall language proficiency.

Keywords: *positive mindset, emotional state, learning with joy, emotional reaction*

Introduction

Understanding the role of emotional stability in language learning is vital for fostering effective educational environments. Emotional states significantly influence student performance and engagement in English language learning. The ability to navigate emotions is critical, as a stable emotional state enhances attention and promotes a more productive learning experience. Current study suggests that learners who maintain a consistent and positive emotional state can engage more deeply with language tasks, facilitating better comprehension and retention of material. This is particularly intriguing as it opens avenues for exploring instructional strategies that cater to enhance students' emotional well-being while learning. However, students often arrive in classrooms with varying degrees of emotional intensity, potentially leading to distractions and disengagement during language exercises. This emotional variability poses a challenge for educators aiming to create a supportive learning atmosphere conducive to language acquisition. A lack of understanding regarding how emotional factors interact with cognitive processes can further exacerbate these challenges, resulting in diminished language proficiency among students.

Our study aims to explore whether positive emotion influences reading comprehension in an effective way.

Literature Review

Emotions greatly affect how we process and retain information, especially when learning a new language. Krashen's Affective Filter Hypothesis (1982) highlights that when students feel positive emotions—like excitement or curiosity—their ability to absorb language improves. On the flip side, emotions like anxiety and frustration can create mental roadblocks, making it harder to comprehend and retain information (Horwitz, 2001). More recent research (Dewaele & MacIntyre, 2016) supports this idea, showing that students who feel confident and engaged perform significantly better in language-learning tasks.

Reading comprehension is not just about recognizing words on a page—it is deeply tied to how students feel while they are reading. Research by Pekrun et al. (2017) suggests that when students associate reading with enjoyment, they tend to engage more and understand texts better. This aligns with Fredrickson's Broaden-and-Build Theory (2001), which explains that positive emotions help the brain think more flexibly and creatively. Other studies (Seli et al., 2016) have found that when students are in a good mood, they focus better and retain information more effectively.

Being able to manage emotions is just as important as experiencing positive ones. Students who have good emotional regulation skills are better at avoiding distractions and staying focused on reading tasks (Gross, 2015). Some studies (Baker et al., 2017) suggest that mindfulness and self-reflection techniques can help students develop this stability, leading to better reading comprehension. Classroom environments also play a role—when teachers create engaging and emotionally stimulating lessons, students tend to be more motivated and persistent in their learning (Frenzel et al., 2009).

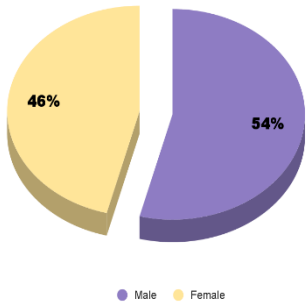
Teachers can actively create a positive emotional atmosphere in the classroom through different instructional strategies. Gamification (Gee, 2003), storytelling, and multimedia integration have been found to make reading more enjoyable and less intimidating for students. Research by Wang et al. (2019) also emphasizes that interactive and context-rich materials can spark emotional engagement, making learning more effective. Another effective approach is cooperative learning—students who engage in group discussions and collaborative tasks tend to not only feel more supported but also improve their overall comprehension skills (Johnson & Johnson, 2009).

Even though there is strong evidence linking emotions and reading comprehension, there are still gaps in the research, especially when it comes to A2-level learners. Most studies focus on students in general without considering how emotional factors might impact lower-proficiency learners differently. There's also a lack of long-term research on how sustained exposure to positive emotional experiences can influence language learning. Future research should dive deeper into these areas, exploring how consistent emotional engagement impacts language retention and overall academic success.

Methodology

We conducted our study with A2-level students, surveying a total of 28 participants. Out of these, 25 students reported feeling positive after watching the video, while the remaining 3 experienced negative emotions. Since our study focused specifically on positive emotions, we carried out our further study on the 25 students who reported a positive emotional reaction. Pre and post-tests with the same level were prepared beforehand.

Figure 1. Sex of Respondents

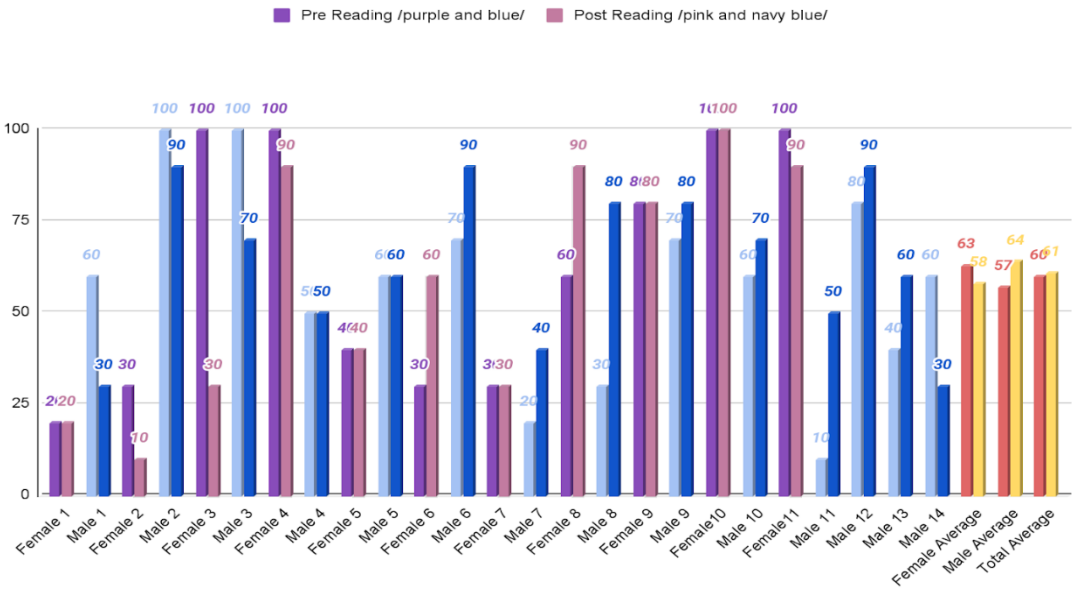


The study used both quantitative and qualitative research methods. It included a 15–20-minute task, the first of which was a pre-reading test featuring a short passage with 10 questions to choose the correct answers, conducted while participants were in a neutral emotional state. After that, they watched a two-minute, humorous video intended to elicit positive emotions. Based on this emotional response, we took a post-reading test consisting of 10 questions to explore whether their emotions influence their performance. Finally, the scores of the two tests were compared to draw a conclusion.

Results

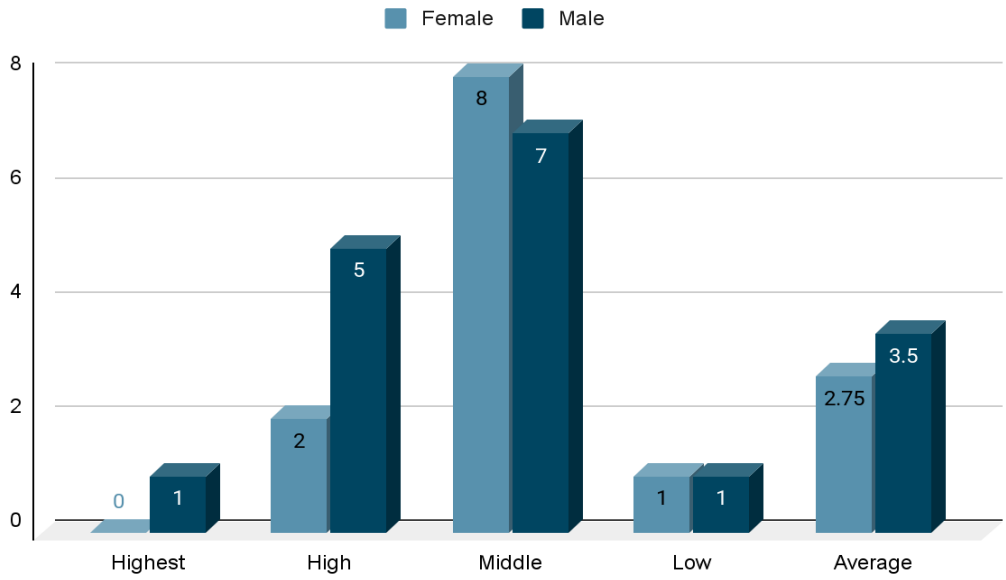
This section presents the results of our survey on how positive emotions affected reading ability. We highlighted the main findings based on participants' responses, showing how their emotions influenced their reading experience. These results provided a general understanding of the connection between mood and reading performance.

Figure 2. Pre and post reading test results



Among the 11 female participants, 4 scored higher on the first exercise, 2 scored higher on the second, and 5 had the same scores on both. Among the 14 male participants, 4 scored lower on the second exercise, 9 scored higher, and 2 had unchanged scores.

Figure 3. Positive emotion by individual after watching the video



Being asked what emotion they had experienced after watching the video, 25 out of 28 participants said they had positive emotion; a total of 8 experienced a high level of positive emotion, while 15 experienced a moderate level of emotion.

In this study, 15 students said they felt moderate emotion after watching the video, including 8 females and 7 males. Among the female students, 4 female students found the first reading exercise somewhat difficult, but after watching the video, they said the second reading exercise felt easier than the first. The remaining four female students responded that they did not experience any noticeable effect. Four male students found the first reading exercise slightly difficult, but after watching the video, they felt the second reading exercise was easier. The remaining three students reported no noticeable difference between the two exercises.

Among those who reported positive emotions, responses to the question of "to what extent" were as follows: 53.6% chose "moderate," 25% chose "high," 10.7% chose "very low," 7.1% chose "low," and 3.6% chose "very high." This suggests that more than half of the participants experienced increased emotional arousal after watching the video.

To further assess emotional impact, participants were then asked to read another A2-level text, followed by ten questions. On average, 18 participants answered each question correctly. This represents an improvement compared to the pre-video test results, indicating that heightened positive emotions contributed to better performance.

The data also revealed that male participants showed greater improvement after watching the video compared to female participants. Both groups completed pre- and post-reading tasks with the same types of questions, assessing their reading comprehension and emotional responses. While females performed better in the pre-reading task, males outperformed them in the post-reading stage.

This suggests that the video had a more positive psychological impact on male participants, leading to a stronger emotional response than in female participants. Three female participants,

who felt positive emotions after watching the video, showed improvement in their test scores.Their scores were higher in the post-test compared to the pre-test. This shows that feeling good can help students understand and focus better on what they are reading. This study confirms that positive emotional states significantly enhance reading comprehension in foreign language.

Conclusion

This paper highlights the significant impact of positive emotions on reading comprehension. Students who experienced emotional engagement demonstrated focus better and understand better, reinforcing the idea that emotional states influence reading performance. Thus, it might be efficient for teachers to foster a positive emotional atmosphere to enhance students' reading comprehension. The results suggest that incorporating enjoyable and engaging content into reading activities can help learners stay focused and process information more effectively.

While our study did not examine long-term effects of emotion, the immediate improvements observed suggested that emotional engagement may play a crucial role in reading success. These insights encourage educators to consider emotional factors when designing reading instruction, ultimately supporting better comprehension outcomes of learners.

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Enhancing English Grammar Skills Using ChatGPT

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Abstract. Artificial intelligence (AI), particularly ChatGPT, is extensively integrated into the educational sector, significantly contributing to the optimization and advancement of language learning processes. This article aims to explore the potential applications, advantages, and disadvantages of using ChatGPT in English grammar instruction while providing theoretical and practical insights and a comprehensive analysis of the resulting outcomes. The research findings indicate that the use of ChatGPT in English grammar education significantly improves the quality of instruction and has the potential to ease the workload of teachers. The ability to rapidly fix mistakes and learn at one's own pace has greatly increased student engagement in the learning process. However, certain drawbacks were also identified. For instance, uncontrolled use of ChatGPT may lead to an over-reliance on technology, which could pose risks such as dependency among learners. Therefore, it is suggested that the technology should be used as an additional tool under teacher supervision and in conjunction with traditional teaching methods for optimal effectiveness.

Keywords: *artificial intelligence, learning outcome, application, grammar checking tool*

Introduction

In recent years, the advancement of artificial intelligence (AI) has led to the integration of various intelligent systems in the field of education. The use of AI in the English language learning process has created opportunities for more effective and flexible learning environments for students. In today's digitalized society, technology profoundly influences students' learning experiences. In Mongolia, the availability of English language learning resources, as well as the accessibility of teachers and instructional specialists, remains limited compared to highly developed countries. Therefore, integrating AI into language education could serve as a viable solution to bridge these gaps. One of the major challenges in learning English is grammar instruction, which is influenced by multiple factors. For instance, due to the lack of a comfortable and stress-free learning environment, students often experience psychological barriers such as anxiety, fear of making mistakes, or hesitation in expressing themselves in English grammar lessons. In this context, exploring the potential of ChatGPT

and other AI-driven tools in overcoming these challenges and assessing their effectiveness is of great importance for both learners and educators.

The objective of this study is to determine the effectiveness of utilizing artificial intelligence, specifically ChatGPT, in English grammar instruction and to analyze its impact on the learning outcomes of students.

ChatGPT, based on the Generative Pre-trained Transformer (GPT) model developed by OpenAI, is an advanced artificial intelligence system that was introduced to the public on November 30, 2022. ChatGPT is an AI-powered technology capable of understanding, processing, and responding to human-written or spoken text. This model has been trained on a vast corpus of text data, enabling it to analyze linguistic patterns and replicate human-like writing and speech styles. As a result, ChatGPT can generate coherent and contextually meaningful responses to user queries, engage in interactive conversations, provide information, and process text for various applications. Beyond its general capabilities, ChatGPT offers significant advantages in the field of education, particularly in English language learning.

In recent years, numerous studies have been conducted on the use of artificial intelligence, particularly ChatGPT, in English grammar instruction. Notable research in this area includes:

The study *Using ChatGPT in English Language Learning: A Study on I.T. Students' Attitudes, Habits, and Perceptions (2024)*, conducted by Vietnam-Korea University of Information and Communication Technology (VKU), surveyed 120 students to assess their perspectives on using ChatGPT for grammar instruction. The findings revealed that the majority of students found ChatGPT highly effective in detecting and correcting grammatical errors. Specifically, ChatGPT demonstrated strong performance in identifying and improving errors related to morphology, syntax, lexical grammar, collocations and phrasal verbs, coherence and cohesion, tense usage, prepositions, and word order. While the participants acknowledged its usefulness as a grammar-checking tool, they also emphasized that ChatGPT cannot fully replace teachers but can serve as a valuable linguistic assistant in the learning process.

The study *Using ChatGPT in English Grammar Assignments and Writing Tasks: Issues and Opportunities (2023),* conducted by Cardiff University, examined the ability of students and instructors to distinguish between essays written by ChatGPT and those written by real students. The research involved both students and faculty members in evaluating the authenticity of academic writing. The findings revealed that only 23% of instructors correctly identified undergraduate-level essays generated by ChatGPT, while 19% successfully distinguished master's-level essays from student-written texts. These results indicate that ChatGPT-produced texts closely resemble those written by students, demonstrating its advanced linguistic capabilities and high grammatical accuracy. Moreover, the researchers advised that rather than imposing a complete ban on ChatGPT, universities should develop ethical and effective policies for its responsible use in academic settings.

The study *The Role of ChatGPT in Language Learning: Insights from Hong Kong's EMI Programs* (2023), conducted by the University of Hong Kong, explored the potential applications of ChatGPT in language instruction. The research found that ChatGPT is particularly effective in correcting grammatical errors and improving sentence structure, making it a valuable tool for language learners. Additionally, the study emphasized that one of ChatGPT's most significant contributions lies in academic writing development, highlighting its ability to enhance the clarity, coherence, and overall quality of student compositions.

Methodology and participants

This study involved 71 B1-level English learners who participated in a research process consisting of two assessments: a primary survey with 5–7 key questions and a set of 10 English grammar tests. The study utilized pre- and post-tests to measure the impact of the intervention.

The participants, aged between 12 and 27 years old, included 29 male and 42 female students, with over 70% having studied English for 2 to 6 years. The participants were divided into two groups: a control group (n=35), which followed a traditional learning approach, and an experimental group (n=36), which received instruction with the aid of ChatGPT.
To ensure data accuracy and enhance research validity, two primary research methods were utilized: survey research and the experimental method. These methodologies are widely employed in educational research to collect and analyze data effectively. A survey was conducted among the 71 B1-level English learners to gather detailed information about how they were using ChatGPT in English grammar class, their attitudes toward it, and the outcomes they observed. The data collected through this survey was then analyzed using statistical methods to perform quantitative analysis and identify the impact of ChatGPT on language learning. This analysis aimed to determine the specific influence ChatGPT had on the participants' grammar learning and overall educational experience.

Results

Among the participants, 54.9% had used ChatGPT, 19.7% had never used it, and 25.4% used it daily. Those who used ChatGPT primarily relied on it for sentence construction (43.9%), grammar correction (22%) and retrieving information in English (34.3%). The pre-test results showed that the control group scored an average of 65%, while the experimental group scored 64%. After four weeks (28 days), the post-test results indicated an improvement.

Table 1. *Pre- and post-test results of the control and experimental groups*

Group	Pre-test average score	Post-test average score	Difference
Control Group (n=35)	65%	68%	4.6%
Experimental group (n=36)	64%	72%	12.5%

With a 12.5% improvement, the study demonstrated that using ChatGPT enhances students' English grammar proficiency.
Participants were asked if they encountered difficulties using ChatGPT for grammar practice over four weeks. The responses were as follows: No -75.7%, Yes - 8.6%, Slightly - 15.7%. Those who reported difficulties mentioned that ChatGPT was unusual without an internet connection, posed a risk of excessive online dependence, and had other unspecified issues.
Participants were also asked how advantageous using ChatGPT for English grammar training was compared to traditional classroom instruction. They highlighted several benefits, including flexibility in self-based learning, instant feedback, the ability to process large amounts of information, and the option to adjust lessons to their proficiency level.
As a result, 80.2% of respondents considered ChatGPT to be highly or mostly advantageous compared to traditional classroom teaching. Additionally, 88.6% of participants enjoyed using ChatGPT for English grammar training. When asked whether they would support ChatGPT as an official tool for grammar instruction, 45% said ‘yes’, 50% ‘agreed but only as a supplementary tool’, and 5% responded ‘no’.

Discussion

According to the outcome of this 28-day study, learners not only used ChatGPT to correct grammatical errors but also sought explanations for those corrections. Teachers were able to utilize ChatGPT as a practice tool and guide for students to study English grammar structures independently through the AI system. This approach not only eased teachers' workload but also fostered students' independent learning skills while helping them avoid excessive dependence on technology.

Conclusion

ChatGPT can be effectively used in English grammar instruction, offering students a more engaging and accessible learning experience. Also, the ability to facilitate independent learning and provide instant feedback makes it a valuable tool in language education. However, using ChatGPT without teacher supervision may have negative effects, such as over-reliance on AI-generated responses. Therefore, integrating ChatGPT with traditional teaching methodologies under the guidance of instructors is the most effective approach. Future research should explore broader applications of ChatGPT in grammar instruction and strategies for optimizing its role in education to enhance learning outcomes.

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A Study on the Role of Technology in Shaping Foreign Language Learning Based on the Students' Perspectives

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Abstract. This study investigates the effects of technological changes on the teaching and learning of foreign languages, particularly how technology redefines pedagogical practices. By utilising survey data, the study explores learner participation with AI-enabled, mobile, and virtual exchange applications. The results demonstrate technology's potential to customise instruction, motivate learners, and address language challenges while also tackling issues of disparity and automation addiction. The study concludes with suggestions on how to teach languages through the integration of modern technologies alongside traditional ones.

Keywords: technological advancement, ITC, ChatGPT

Introduction

Technology has considerably improved methods of teaching interdisciplinary subjects like English, making the process of acquiring a new language much easier and simpler. The introduction of AI based tutors and mobile applications have made learning experiences more dynamic, individualized, and engaging than ever before. Such tools not only supplement conventional methods of learning languages, but also open up new and effective ways of Technology has considerably improved methods of teaching interdisciplinary subjects like English, making the process of acquiring a new language much easier. The introduction of AI-based tutors and mobile applications has rendered learning experiences more dynamic, personalised, and engaging than ever before. Such tools not only supplement conventional methods of language learning but also open up new and effective avenues for language acquisition, enhancing the enjoyment of the learning process. This research aims to explore how technology can enhance language teaching in ways that significantly improve accessibility and interactivity. Consider how technology can enhance language teaching by significantly improving accessibility and interactivity.

Literature Review

The integration of digital technology in language learning has significantly transformed traditional approaches to education. Various tools, including mobile applications, online platforms, and artificial intelligence (AI), have been developed to enhance language acquisition. While these advancements offer new opportunities for language learners, their effectiveness relies on factors such as accessibility, pedagogical design, and socio-cultural considerations. This literature review examines existing research on the benefits, challenges, and effectiveness of digital tools in language learning, critically analysing how these technologies impact language education. Research shows that traditional language teaching often neglects socio-political contexts, limiting learners' ability to engage critically with language. Such critiques advocate for pedagogical frameworks that integrate linguistic proficiency with cultural and social awareness. This perspective aligns with the need for digital

tools to be designed with inclusivity in mind, ensuring they address the diverse backgrounds of learners rather than reinforcing existing inequalities. Supporting this argument, it highlights the transformative potential of digital technologies, particularly in expanding access to language learning resources on a global scale. However, as this research suggests, the benefits of such technology are not universally experienced due to disparities in access. This demonstrates that while digital tools have the capacity to democratise education, their implementation must be carefully managed to avoid exacerbating educational inequities. Examining the role of mobile applications in language learning, this research emphasises how apps like Duolingo facilitate continuous engagement with language through gamified learning experiences. The findings indicate that mobile-assisted language learning (MALL) is particularly valuable in low-resource environments, where traditional classroom instruction may be limited.

However, this also reveals a crucial limitation—while these applications promote self-directed learning, they often fail to develop the deeper linguistic and cultural competencies necessary for full language proficiency. Aligning with the critique, this suggests that digital tools should serve as supplementary aids rather than as complete replacements for human-centered instruction. Without the contextual depth provided by traditional pedagogical methods, learners risk acquiring only surface-level proficiency.

Observing advancements in immersive technology, this research explores the impact of virtual reality (VR) on language acquisition. It illustrates how VR creates authentic language-learning environments that simulate real-world interactions, fostering both linguistic and socio-cultural competence. While this suggests that VR could play a transformative role in education, its high costs and accessibility limitations present significant barriers. This aligns with the concerns raised regarding technological disparities—if VR is to become a meaningful educational tool, efforts must be made to ensure its accessibility across different socio-economic contexts. Nonetheless, this study underscores that when properly implemented, VR has the potential to bridge the gap between theoretical language learning and real-world application.

The increasing role of AI in education further reshapes language learning, as explored by (Lin, 2021). This study highlights the benefits of AI-driven tools, particularly their ability to provide immediate, personalized feedback at scale. This demonstrates how AI can address a long-standing challenge in traditional education—ensuring individualized attention in large classrooms. However, observing this research, it is clear that AI, while effective in automating certain aspects of language instruction, lacks the human intuition necessary for nuanced language acquisition. This supports the argument that AI should not be viewed as a substitute for human interaction, but rather as an enhancement that complements traditional teaching methods.

Despite these technological advancements, the issue of equitable access remains a critical concern. (Zhou, M & Lee, J, 2020)investigate the digital divide, revealing how disparities in technology access prevent underprivileged learners from fully benefiting from digital educational tools. This raises essential pedagogical and ethical questions—can digital technology truly promote equitable language learning if it remains inaccessible to those who need it most? This research underscores the need for systemic interventions that prioritize digital inclusion. Without such measures, the very tools designed to enhance learning may instead contribute to widening educational inequalities.

Synthesizing these perspectives, this study blends critical pedagogy, as articulated by (Auerbach, 1993), with technological affordances, as outlined by (Hockly, 2018) and (Lin, 2021). Additionally, the research (Godwin-Jones, 2018) and (Sweeney, 2019) informs the discussion on mobile-assisted and immersive learning tools, demonstrating their potential to create rich, contextually meaningful language-learning experiences. Ultimately, while digital technology presents innovative solutions for language education, its effectiveness hinges on its thoughtful application—one that balances technological innovation with pedagogical inclusivity and critical awareness of learners' diverse needs.

Research Results and Methodology

The study was carried out under the guidance of my professor, with an objective to investigate the role of technology in language learning, mainly through AI-powered applications and immersive learning environments. Data for this study were collected using a survey that was developed and administered by us through Google Forms to get responses from language learners. The survey sought to assess the effectiveness of different digital tools on language acquisition as well as their impact on engagement, retention, and fluency. This was shared with 34 individuals who are currently active in pursuing a foreign language for better fluency. The design of the survey merged both quantitative and qualitative aspects relating to the use of digital tools such as mobile apps, AI-driven language assistants, speech recognition aids, among others.

Research Question: *How does technology affect your foreign language learning?*

Research Results

1. Your gender?

Results:

- Out of 29 students, 82.8% were female, and 17.2% were male.

Summary:
Most respondents were female, indicating that more female students participated in the survey. This suggests that female students may have a higher interest in learning foreign languages using technology, as they were more engaged in this study.

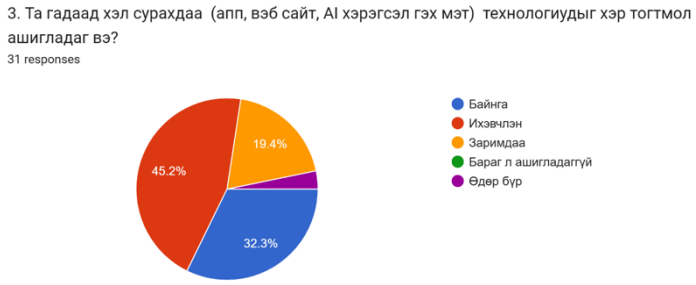
2. Which course are you?

Results:

- 30 students responded to this question.
- 66.7% were seniors, 13.3% were juniors, 13.3% were freshmen, and the remaining 6.7% were sophomores.

Summary:
This shows that senior students showed the highest participation in the survey. This suggests that older students tend to have a greater interest in exploring AI, technology, and app-based language learning methods, possibly due to their advanced academic experience and exposure to diverse learning tools.

3. How often do you use technology (apps, websites, AI tools, etc.) for learning a foreign language?



Results:

- 32.3% of 31 respondents said they always use technology.
- 45.2% said they usually use it.
- 19.4% said they sometimes use it.
- The remaining respondents answered every day.

Summary:
The results Indicate that the majority of students (over 77%) frequently use technology for foreign language learning, with a significant portion incorporating it into their daily routine. This suggests that digital tools are not merely supplementary but have become an integral part of modern language acquisition. Students who use technology always or usually are likely to rely on language-learning apps, AI-powered tools, and websites to enhance their skills. Meanwhile, those who use it sometimes may prefer traditional methods or engage with technology only when necessary. The fact that some students reported using technology every

day highlights how digital tools have become entrenched in consistent language practice, providing accessibility, interactivity, and personalised learning experiences. These findings reinforce the idea that technology plays a crucial role in supporting learners, assisting them in practising listening, speaking, reading, and writing skills more effectively than traditional methods alone. It also implies that as technology advances, its integration into language learning is likely to continue growing, making it a fundamental tool for students.

4. What type of technology do you use most for learning a foreign language?

Results: (Based on 33 responses)

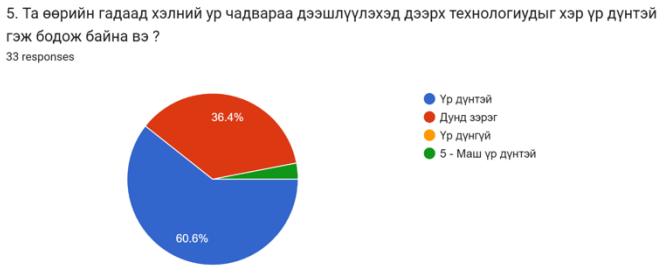
- 63.6% (21 students) use media apps (e.g., TikTok, YouTube).
- 57.6% (19 students) use mobile apps (e.g., Duolingo, Memrise).
- 48.5% (16 students) use AI language tools (e.g., ChatGPT, DeepSeek).
- 24.2% (8 students) use online platforms (e.g., Coursera, EdX).
- 3% (1 student) uses AI-powered chatbots and pronunciation tools.
- 3% (1 student) uses social media apps (e.g., Facebook, Instagram, TikTok, YouTube).

Summary:

The data reveals that the most commonly used technology for foreign language learning is media apps (63.6%), such as YouTube and TikTok. This suggests that students prefer visual and interactive content, which facilitates listening practice, real-life language exposure, and engaging short-form educational videos. Following closely, 57.6% of students utilise mobile apps like Duolingo and Memrise, indicating that structured, gamified learning experiences are also highly favoured. These apps offer an easy-to-use interface, bite-sized lessons, and progress tracking, making them a convenient choice for self-paced learning. Interestingly, AI language tools (48.5%), such as ChatGPT and DeepSeek, are becoming a popular method for learners, suggesting a growing reliance on AI-generated feedback, translation assistance, and interactive conversation practice. This shift reflects the emerging role of AI in personalised language learning. Despite the availability of structured online courses on platforms like Coursera and EdX, only 24.2% of students reported using them, possibly due to their more formal structure and time commitment. Additionally, AI-powered chatbots and pronunciation tools, as well as social media apps, were the least used (3% each), indicating that students may not yet fully trust AI-based pronunciation tools or actively engage in language learning through social media interactions. These findings highlight that students prefer dynamic, interactive, and easily accessible digital tools over more traditional, structured courses. The increasing use of AI-

driven resources and media-based learning suggests a shift toward more flexible, personalized, and immersive foreign language learning experiences.

5. How effective do you think the above technologies are in improving your foreign language skills?



Results: (Based on 33 responses)

- 60.6% (20 students) find the technologies effective.
- 36.4% (12 students) find them to be moderately effective.
- 3% (1 student) find them very effective.
- A few students haven't answered.

Summary:

Many respondents (60.6%) believe that the technologies they use for language learning are effective in improving their skills. This suggests that most students find value in digital tools such as apps, AI-powered language tools, and media platforms to enhance their language proficiency. Additionally, a significant portion (36.4%) considers these technologies to be moderately effective, indicating that while these tools may assist, there might still be room for improvement or integration with traditional learning methods. Interestingly, only 3% of students found the technologies very effective, which may suggest that while many students appreciate their benefits, some may still perceive limitations or prefer more structured approaches for significant skill advancement. This data indicates that technology-based language learning tools are widely regarded as beneficial; however, students might still feel that they are not yet entirely sufficient in isolation, and a more balanced approach combining digital and traditional methods could be more effective.

6. Have interesting tools (such as social apps, artificial intelligence, etc.) increased your motivation to learn a foreign language?

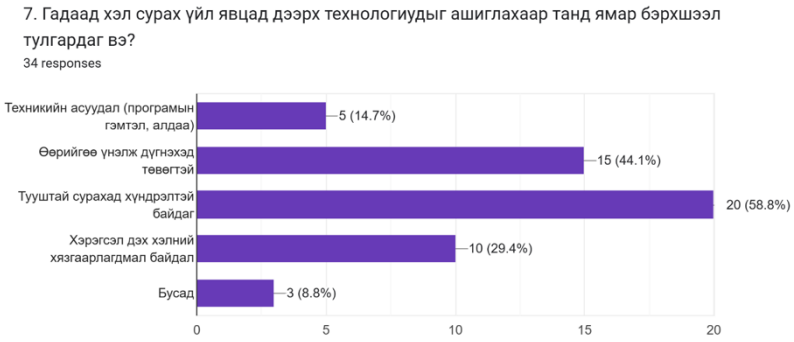
Results: (Based on 34 responses)

- 64.7% (22 students) said Yes.
- 5.9% (2 students) said No.
- 29.4% (10 students) said they Don't know.

Summary:

A significant majority of students (64.7%) reported that tools like social apps and artificial intelligence have increased their motivation to learn foreign languages. This reflects the growing appeal of interactive and engaging technologies, which provide students with personalised, dynamic, and enjoyable learning experiences. However, 5.9% of students disagreed, indicating that some may not find these tools as motivating or might prefer traditional language learning methods. Additionally, a notable portion (29.4%) of students were unsure, suggesting that while these technologies may have some impact, their influence on motivation might not be as clear-cut for all learners. This indicates that while modern digital tools are highly effective for many students in boosting engagement and interest, their impact can vary depending on individual preferences and learning styles. The uncertainty in responses also highlights that further research is needed to understand how these tools influence motivation across different groups of learners.

7. What challenges do you face when using the above technologies for learning a foreign language?

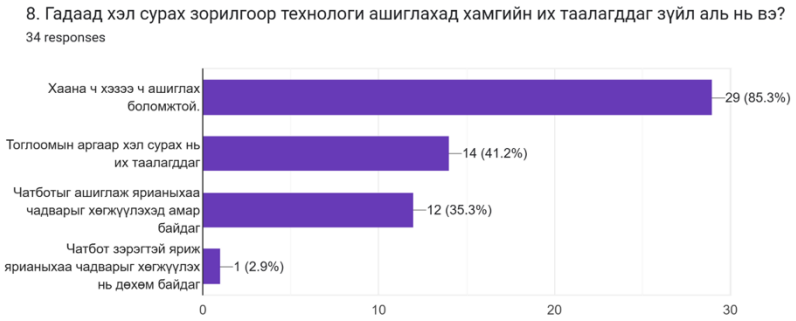


Results: (Based on 34 responses)

- 14.7% (5 students) experience technical issues (e.g., app glitches, errors).
- 44.1% (15 students) find it difficult to self-assess their progress.
- 58.8% (20 students) struggle with maintaining consistent learning.
- 29.4% (10 students) face limitations in language options within the tools.
- 8.8% (3 students) reported other challenges.

Summary:

The most common challenge faced by students is difficulty in maintaining consistent learning (58.8%). This suggests that despite the availability of digital tools, students struggle with staying motivated or managing their time effectively to use the tools regularly, which may impact their overall learning progress. A significant portion (44.1%) mentioned that self-assessment is challenging, indicating that many digital language tools may not provide adequate feedback or might make it difficult for students to gauge their own improvements without more personalised assessments. Technical issues, such as app glitches or errors, were reported by 14.7% of students, showing that while technology can be a powerful tool, technical reliability remains a potential barrier for users. Another notable issue is the language limitations in some tools, with 29.4% of students indicating that the lack of language options can restrict their ability to practise the specific languages they are learning. Lastly, 8.8% of students reported other challenges, which could include factors like user interface difficulties or learning curve issues with more advanced tools. This data highlights that while technology plays a crucial role in language learning, several challenges hinder its full effectiveness, particularly concerning motivation, self-assessment, and technical reliability. 8. What do you like most about using technology for learning a foreign language?



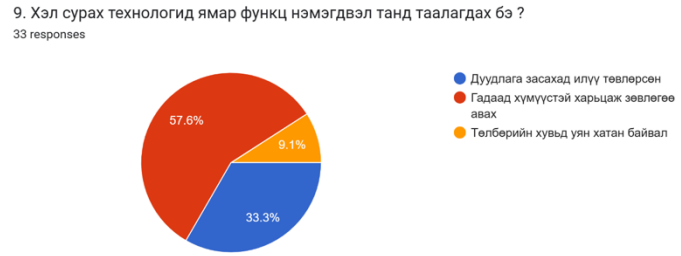
Results: (Based on 34 responses)

- 85.3% (29 students) appreciate that technology allows them to use it anywhere, anytime.
- 41.2% (14 students) enjoy learning through gamified methods.
- 35.3% (12 students) find it easy to develop speaking skills using chatbots.
- 2.9% (1 student) prefers using chatbots to practice speaking.

Summary:

The most appreciated aspect of using technology for language learning is its flexibility, with 85.3% of students noting the ability to access learning tools anytime, anywhere. This flexibility highlights the appeal of technology for busy students, as it allows them to practise at their own pace, without being tied to a specific location or schedule. Another notable preference is the use of gamified methods for language learning, as 41.2% of students enjoy the interactive, engaging nature of games in their learning process. This shows that many students are motivated by fun, competition, and rewards in language learning apps. A significant portion (35.3%) finds that chatbots are particularly useful for developing speaking skills, making AI-powered conversation practice a valued tool for language learners. However, only 2.9% of students prefer chatbots exclusively for this purpose, indicating that while chatbots are helpful, students may also combine them with other methods. These results highlight that convenience, interactivity, and the ability to practise speaking are the primary factors that make technology appealing for language learning. Students value tools that are accessible and engaging while also enabling them to practise real-world language skills.

9. What features would you like to see added to language learning technologies?



Results: (Based on 33 responses)

- 57.6% (19 students) would like advice from native speakers.
- 33.3% (11 students) prefer features that focus more on pronunciation correction.
- 9.1% (3 students) would like more flexible payment options.

Summary:

The most popular feature students would like to see added is the ability to receive advice from native speakers (57.6%). This suggests that many learners value direct interaction with native speakers for authentic language practice, cultural insights, and feedback on their language use. 33.3% of students expressed interest in technologies that focus more on pronunciation correction, indicating that they are eager to improve their speaking accuracy, possibly through more AI-driven pronunciation feedback or interactive voice features. A smaller portion (9.1%) would appreciate more flexible payment options, which highlights that affordability remains a consideration when selecting language learning tools. Overall, students seem to prefer features that enhance their speaking skills and provide opportunities for real-world interactions. This feedback indicates a desire for more personalised, practical, and affordable learning experiences.

Discussion

The current research aims to examine the role of digital technology in foreign language

learning by investigating learner engagement, tool effectiveness, and the challenges of technology-based language teaching. The findings, derived from a survey of 34 learners, provide an insightful perspective on the integration of various digital tools in ongoing language learning processes.
Interpretation of Findings The results from the surveys indicate a pervasive integration of technology among the learners. For instance, 32.3% of the students reported always using technology, with a further 45.2% usually doing so. The high frequency of use demonstrates that digital tools are integral components of language learning routines rather than merely supportive additives. In particular, the preference for media apps (63.6%) and mobile applications (57.6%) highlights the use of platforms that offer interactive, enjoyable, and multifaceted learning experiences. Moreover, most respondents (60.6%) perceived these technologies as effective in enhancing their language capacity, although not many (3%) thought they were very effective. This discrepancy indicates that current digital tools are useful but that there remains room for development—particularly in providing more detailed linguistic and cultural context. The results further reveal that 64.7% of students were more motivated by the use of interactive tools such as social apps and AI-powered resources, which underscores the importance of interactivity and personalisation in maintaining student interest.

These findings align with current research that emphasises the use of technology to create personalised and adaptive learning environments. The fact that AI-powered tools were regarded as effective is supported by literature indicating that real-time feedback can accelerate the learning process. Similarly, the positive impact of immersive tools like virtual reality on retention is backed by previous research showing the effectiveness of multisensory learning experiences. However, the current study also contributes to these findings by highlighting issues that have been less frequently discussed in the literature, such as self-assessment and habitual study routines.

Limitations

Despite the insightful observations gathered, the research is not without its limitations. The small sample size of 34 students may potentially restrict the generalisability of the findings. Furthermore, the questionnaire relied on self-reported data, which can introduce inherent biases, such as overestimating usage or ability. The cross-sectional survey also limits the ability to draw inferences about the long-term impacts of technology on language learning.

Conclusion

This research provides evidence that digital tools create transformative impacts on contemporary foreign language education. The results from 34 participants reveal that technology tools such as AI-powered assistants, mobile apps, and virtual environments markedly enhance learner engagement along with their ability to retain information and develop language proficiency. These findings demonstrate distinct advantages, including personalised feedback and increased motivation; however, they also highlight ongoing challenges. The limitations of current technology-based methods become evident through issues such as insufficient human contact during learning sessions, difficulties learners face in assessing their own progress, and unequal access to sophisticated tools. The results underscore the need for a hybrid educational approach that combines digital advancements with traditional

face-to-face teaching to achieve language acquisition that balances technical proficiency with cultural understanding. Subsequent research must investigate these shortcomings and develop strategies to ensure equitable access and sustainable impact in digital language instruction.

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The Impact of Foreign Language on Psychological Well-Being

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Abstract. The purpose of this study was to explore how bilingual communication—using a foreign language in addition to one's mother tongue—impacts psychological well-being. The study utilized the PERMA model to assess participants' levels of positive emotions, engagement, positive relationships, meaning in life, and achievement. A total of 44 Mongolian children, aged 13–16, from public and private secondary schools participated, including 15 monolingual and 29 bilingual students. The results indicated that being bilingual not only enhances communication skills but also makes a positive contribution to psychological well-being, personal development, career growth, and goal achievement.

Keywords: *bilingualism, monolingualism, psychological well-being*

Introduction

In recent years, there has been growing interest in how foreign language use affects brain function, language centers, and information processing. Alongside this, studies are increasingly focusing on how learning a foreign language influences cognitive development, psychological maturity, and social interactions. Numerous studies have shown that learning a foreign language has a positive impact on a person's flexibility, open-mindedness, adaptability to new environments, goal orientation, sense of meaning, creativity, and verbal skills. Global research confirms that learning a foreign language at an early age is more effective (Lightbown & Spada, 2013), prompting Mongolia to legally adopt English as its primary foreign language. Children's language acquisition ability peaks at an early age, making it the ideal time for learning a second language. The adoption of English as the main foreign language aligns Mongolia with international trends (Ministry of Education and Science of Mongolia, 2022), and this policy has been integrated into school curricula (General Education Curriculum Policy Document, 2023).

Starting foreign language instruction at an early age is vital for preparing globally competitive citizens. Language acquisition not only helps with job prospects but also fosters intellectual growth, cultural understanding, and a deeper sense of meaning in life. Additionally, bilingualism has become a societal necessity. Due to globalization, multilingual and multicultural communication has expanded significantly, and bilingualism is increasingly important both individually and socially. For instance, between 2010 and 2015, demand for bilingual workers in the U.S. doubled, highlighting the practical value of foreign language skills (New American Economy, 2017).

Psychological and educational studies also emphasize the importance of bilingualism. Early foreign language learning positively impacts children's cognitive development, thinking skills, and academic success (U.S. Department of Education, 2017). Moreover, bilingual individuals tend to be more adaptable, open, and tolerant in diverse social contexts (Cambridge University Press, 2021). These findings demonstrate the numerous advantages of bilingualism and its positive effect on human thought and behavior.

Research Objective

To investigate whether bilingual language use influences psychological well-being.

Methodology

The study included 44 Mongolian children aged 13–16 from public and private schools, comprising 27 monolingual and 17 bilingual participants. A questionnaire collected demographic information, including age, gender, spoken languages, foreign language proficiency level, years of foreign language study, and daily hours of foreign language use.

To assess psychological well-being, the PERMA test was used. With a Cronbach's alpha of 0.70, the test was deemed reliable. It includes 23 questions measuring the following indicators:

- Positive emotions
- Engagement (deep involvement in activities)
- Positive relationships
- Meaning (sense of purpose in life)
- Achievement

Additional indicators:

- Health
- Loneliness

Scores were calculated by averaging responses for each indicator.

Results

Among the 32 participants (17 from public schools and 15 from private schools), there were 14 males and 18 females. In the bilingual group, 60% rated their English proficiency as good or very good, with most having studied their second language for 7–9 years.

Table 1

Indicators		N	P	Mean	Std.
Positive emotions	Monolingual	17	.664	6.1333	1.65136
	Bilingual	15		6.4118	1.94197
Relationship	Monolingual	17	.555	7.1333	1.53168
	Bilingual	15		7.4706	1.66274
Positive relation	Monolingual	17	.564	6.9333	1.59463
	Bilingual	15		6.5686	1.93565
Meaning	Monolingual	17	.604	5.9778	1.07988
	Bilingual	15		7.0392	1.37882
Accomplishment	Monolingual	17	**.021**	5.2000	1.58264
	Bilingual	15		5.4118	1.95622
Total point	Monolingual	17	.308	6.2298	.84332
	Bilingual	15		6.5761	.98258

From Table 1, there were no statistically significant differences between monolingual and bilingual participants in most indicators (p-values > 0.05). However, a significant difference was found in the "Achievement" indicator (p = 0.021), suggesting that bilingual and monolingual individuals may differ in their perceived achievement levels.

Conclusion

The study results show that for most indicators (positive emotions, engagement, positive relationships, meaning), there were no statistically significant differences between monolingual and bilingual participants (p > 0.05). This implies that language background might not have a strong influence on these aspects of psychological well-being. However, in the "Achievement" category, a statistically significant difference (p = 0.021) was found. This indicator reflects satisfaction with personal success, goal attainment, motivation for self-development, and self-evaluation of achievements. Bilingual participants had a higher average score (5.4118) than monolinguals (5.2000), suggesting they may be more goal-oriented and have a stronger sense of accomplishment.

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Psychometric Properties of the Mongolian Version of the Brief Resilience Scale

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Abstract. This study aims to establish the psychometric properties of the Mongolian version of the Brief Resilience Scale (BRS), a short questionnaire measuring psychological resilience, and involved 469 participants aged 18-65 residing in Mongolia. As a result of the study, the questionnaire showed a Cronbach's alpha coefficient of $\alpha = 0.707$. Convergent validity testing revealed a negative correlation with the HADS questionnaire and a positive correlation with the WHO-5 questionnaire. Exploratory Factor Analysis (EFA) supported a one-factor structure, consistent with international studies. Confirmatory Factor Analysis (CFA) was conducted, and model fit indices were adjusted by correcting errors (CFI = 0.984, TLI = 0.965, SRMR = 0.068, RMSEA = 0.052).

Keywords: Validity, Reliability, Recovery from Adversity

INTRODUCTION

Over the past 10 years, psychological resilience has become one of the main topics of research in behavioral and medical sciences (Chmitorz et al., 2018). Furthermore, in the field of mental health, there has been a paradigm shift from focusing on individual deficits to emphasizing strengths, and resilience has continued to develop through decades of research (Vella et al., 2019). The American Psychological Association defines psychological resilience as the ability to adapt well to stressors such as health issues, injury, tragedy, threats, or family and relationship problems, or the capacity to recover from difficult circumstances (APA, 2015). Since the early 1990s, the focus of resilience research has shifted from protecting against factors influencing stress and adversity to examining how individuals cope with the stress and challenges they face. Psychological resilience is closely related to both negative and positive emotions experienced by individuals, as well as to life challenges and difficulties. Establishing

the psychometric properties of measurement methods is the first step, which is important because it enables the study of psychological resilience across all sectors, age groups, and regions, following the example of other countries.

The Brief Resilience Scale (BRS) was developed in 2008 by Smith and colleagues (Smith B et al., 2008) as a unidimensional, six-item questionnaire. Various countries have adapted it to their own linguistic and cultural contexts, establishing psychometric properties for versions that sometimes include two factors, and it is widely used. The general model's internal consistency reliability should have a Cronbach's alpha of 0.70 or higher; convergent validity correlations typically range between ±0.2 and ±0.5; Exploratory Factor Analysis (EFA) results support either a one- or two-factor structure; and Confirmatory Factor Analysis (CFA) fit indices such as CFI, TLI, NFI, and GFI should be greater than 0.90, while RMSEA and SRMR should be less than 0.1, which are considered optimal values.

Methodology

Data for the study were collected in March 2025 using Google Forms. Data that did not meet the requirements were excluded using Z-scores from descriptive analysis in SPSS, and the results were processed accordingly.

The psychometric properties of the brief scale measuring psychological resilience were examined following the steps below:

1. Obtained official permission from the scale's author and translated it from English into Mongolian
2. Conducted a pilot study
3. The Mongolian version of the scale was evaluated by professional experts (CVI = 0.80)
4. Conducted the main study
5. Assessed the reliability
    - Internal consistency reliability (Cronbach's Alpha .80–.91)
6. Assessed the validity
    - Content Validation Index
    - Construct Validity: To assess convergent validity, the HADS (Энхнаран et al., 2021) and ДЭМБ-5 (Тэргэлсаран, 2024) scales were used.
    - Factor validity (Exploratory Factor Analysis [EFA] and Confirmatory Factor Analysis [CFA] with CFI, TLI, NFI, GFI > 0.90, and RMSEA, SRMR < 0.1)

Results

A total of 469 individuals aged 18 to 65 residing in Mongolia participated in this study, of whom 26.7% were male and 72.9% female, with an average age of 34. Additional information on participants' marital status, employment, education, and general physical health was also collected. No statistically significant differences were found in the Brief Resilience Scale (BRS) scores measuring psychological resilience across these variables.

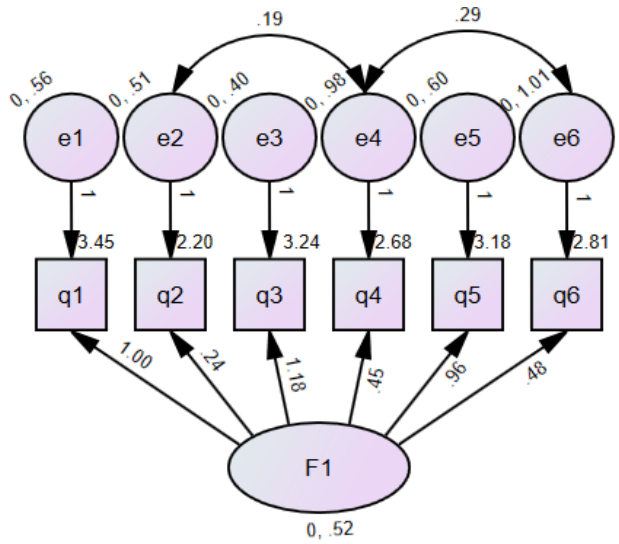
The reliability of the BRS measure was examined, yielding a Cronbach's Alpha of $\alpha = .70$ and McDonald's Omega of $\omega = .71$. The participants' average score was 2.9 ± 0.6, indicating a low level of psychological resilience. The sample size was adequate for the analysis, as indicated by a KMO value of 0.739 ($p < 0.001$).

Factor analysis results supported a one-factor structure for the BRS questionnaire. Items 1, 3, and 5 of the questionnaire have positive loadings, while items 2, 4, and 6 have negative loadings. Although countries such as South Korea (Junhyung K et al., 2023), Portugal (Leandro da Silva-Sauer et al., 2020), and Arab countries (Baattaiah, B. A. et al., 2023) have reported a two-factor structure, other countries use a one-factor model. Exploratory Factor Analysis (EFA) of the main component, under the condition that the eigenvalue is greater than 1, confirmed a one-factor structure explaining 60.4% of the variance in the data.

Table 1. Factor Loadings

	Factor	
	1	**Uniqueness**
Question 1	0.683	0.534
Question 2	0.309	0.904
Question 3	0.740	0.452
Question 4	0.408	0.834
Question 5	0.637	0.594
Question 6	0.412	0.830

Figure 1. Results of the Confirmatory Factor Analysis



The results of the Confirmatory Factor Analysis (CFA) were entered into the AMOS software, and after adjusting for model errors, the fit indices were CFI = 0.984, TLI = 0.965, SRMR = 0.068, and RMSEA = 0.052.

Table 2. Results of Convergent Validity

	HADS (Anxiety)	HADS(Depression)	WHO-5
Brief Resilience Scale	-.203**	.193**	-.361**

Table 3. Values of Confirmatory Factor Analysis for Mongolian and International Studies

Translated language	N	CFI	TLI	SRMR	RMSEA
German	1128	1.00	-	0.01	0.01
Arabic	1072	0.97	-	-	0.09
Korean	1022	0.999	0.99	0.01	0.06
Chinese	511	0.997	0.992	0.028	0.043
Mongolian	486	**0.984**	**0.965**	**.068**	**0.052**

Discussion

The Mongolian version of the BRS scale aligns with psychometric indicators and the one-factor structure found in other countries' results. The original questionnaire has a one-factor structure, and internationally, it is commonly adapted and used based on this single-factor model. Similarly, for Mongolia, the one-factor structure of the BRS scale is more appropriate. The scale's reliability, as indicated by Cronbach's Alpha (α = .71), is consistent

with results from China (Fung, S.-f., 2020). Countries generally use the HADS and WHO-5 questionnaires to assess convergent validity, with correlation results at similar levels. Future psychometric validation studies should increase sample size and confirm internal consistency through test-retest reliability

Conclusion

This study was conducted to determine the psychometric properties of the Mongolian version of the Brief Resilience Scale, which measures psychological resilience, and included participants from Ulaanbaatar city as well as rural areas.

The results of the study supported a one-factor structure for the questionnaire, with high levels of reliability and validity indicators. In terms of convergent validity, the scale showed a negative correlation with the HADS questionnaire measuring depression and anxiety, and a positive correlation with the WHO-5 questionnaire measuring well-being, indicating good construct validity. Based on the findings, it is concluded that the Mongolian version of the BRS questionnaire is fully suitable for use in psychological research, analysis, and practical applications.

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