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JOURNAL PURPOSE

The purpose of *the Oikos - The Zimbabwe Ezekiel Guti University Bulletin of Ecology, Science Technology, Agriculture and Food Systems Review and Advancement* is to provide a forum for scientific and technological solutions based on a systems approach and thinking as the bedrock of intervention.

CONTRIBUTION AND READERSHIP

Natural scientists, engineering experts, technologists, multidisciplinary teams are encouraged.

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SCOPE AND FOCUS

The journal is a forum for the discussion of ideas, scholarly opinions and case studies of natural and physical science with a high proclivity to multidisciplinary approaches. The journal is produced bi-annually.

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Abstract: must be 200 words
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ChatGPT Experiences in Universities in Zimbabwe

MOYO ABEL[1], MAKOTA JUSTIN[2] AND GUMBO SHEPHERD[3]

Abstract

ChatGPT is in popular use among academics from across regions even though little is known about its effectiveness as a teaching and learning method. This study, underpinned by a mixed methods research design, critically evaluates ChatGPT's effectiveness through the experiences of Zimbabwean university lecturers and students who are currently using ChatGPT for teaching and learning. The study employed a multi-site case study research design, utilising face-to-face interviews and document analysis as data collection methods. Purposive sampling was used to select three students and three lectures from each of the three identified universities that are identified by pseudonyms. The data were analysed thematically. The findings show that both students and lecturers use free ChatGPT facility only when doing their academic work. Hence were not privy to other packages that required monetary subscriptions thus its effectiveness could not be conclusively determined basing on the experiences from the free facility only. It also appeared that the participants lacked technical skills in the proper utilisation of technology culminating into

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overreliance on ChatGPT. The library was sparingly used leading to potential for misinformation and increased lack of personalised feedback. Investment in technology by universities is required. The students and lectures need to be guided by policy and training on the proper use of ChatGPT technology.

Keywords: Artificial intelligence (AI), Universities, Zimbabwe

INTRODUCTION

The emergence of Generative Pre-trained Transformers (GPT) has significantly transformed the landscape of teaching and learning in higher education. Recent studies (Chui *et al*., 2022; McKinsey, 2023; Noorden, 2023) highlight how tools like ChatGPT facilitate human-like interactions, providing students with immediate responses to inquiries, translating texts across languages, and summarizing complex information. While these advancements represent remarkable technological progress, their integration into academia raises important questions about reliance on AI. Scholars such as Lund *et al.* (2023), Winder (2023), and Cano *et al*. (2023) assert that ChatGPT is gradually supplanting traditional educational roles.

In the United States, a recent investigation reveals that despite the numerous benefits ChatGPT offers, both students and educators exhibit an over-reliance on AI tools that poses risks to academic integrity (Qureshi, 2023; Sabzalieva and Valentini, 2023). Meanwhile, Nordic countries—Denmark, Sweden, Norway, Finland, and Iceland—are navigating the challenges and opportunities associated with this technological advancement (Cascella *et al*., 2023). In South Africa, studies indicate that AI chatbots may undermine the integrity of creative and academic work by generating human-like texts and images, further complicating perceptions of effective technology use

among students and faculty (Bosch and Uzuegbunam, 2023). Interestingly, academics report possessing adequate digital skills but lack proficiency in AI-related competencies.

APPLICATION OF ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) encompasses the capacity of machines and computer programmes to perform tasks that typically require human intelligence (Lo, 2023). Dwivedi *et al.* (2023) note that these tasks include visual perception, speech recognition, decision-making, and language translation. Researchers such as Bovee and Bovee (2023) and Dohale *et al.* (2022) emphasise the role of algorithms and computer programmes in analysing data, identifying patterns, and making informed decisions. AI encompasses several subfields, including machine learning, natural language processing, computer vision, and robotics (Dohale *et al*., 2022; Lo, 2023; Science, 2012). The transformative potential of AI spans various industries, including healthcare, finance, and education, as it automates routine tasks and enhances decision-making (Bilgic *et al*., 2022; Roumeliotis and Tselikas, 2023; Shin *et al.,* 2021). However, the development and deployment of AI also introduce ethical, social, and economic challenges that must be addressed to ensure responsible and equitable use.

The integration of AI technologies into universities in Zimbabwe has the potential to enhance academic performance. However, the introduction of AI in universities is not without challenges, such as ethical considerations, data privacy concerns, and potential displacement of jobs. The article explores the concept of ChatGPT technology in universities, that refers to the rapid and widespread integration of AI technologies across various academic disciplines and administrative functions. Through a comprehensive review of literature, the article explores the experiences university students and

lectures encounter in using ChatGPT, the challenges experienced, and how these challenges can be mitigated. The main research questions are:

1. How do university lecturers and students experience the use of ChatGPT in teaching and learning?
2. What challenges are experienced by educators and students when using ChatGPT in universities?
3. How can ChatGPT be used effectively in higher and tertiary institutions by students and lectures?

LITERATURE REVIEW

Dwivedi *et al*. (2023) and (Cotton *et* a*l*., 2023) argue that ChatGPT is an artificial intelligence language model developed by OpenAI, building upon the success of the GPT series. OpenAI initially released GPT-1 in 2018, that showcased the ability to generate coherent and contextually relevant text through large-scale pre-training and a transformer architecture. GPT-2, released in 2019, further improved upon this model with a larger size and training dataset, generating significant attention for its language generation capabilities. OpenAI's subsequent release, GPT-3, in 2020, was a groundbreaking development in language modelling. With 175 billion parameters, it became the largest language model at the time and showcased impressive abilities in performing language-related tasks, generating creative text, and engaging in interactive conversations. Building on the advancements of the GPT series, OpenAI developed ChatGPT as a specialized variant focused on interactive and dynamic chatbot interactions. ChatGPT utilises the transformer architecture and leverages large-scale pre-training and fine-tuning to enable responsive and context-aware conversations. OpenAI has continued to refine and improve their language models, including ChatGPT, through ongoing research and development efforts. These models have undergone multiple iterations

to enhance performance, address limitations, and ensure responsible and ethical use.

ChatGPT, that is based on the GPT (Generative Pre-trained Transformer) architecture, is a language model developed by OpenAI. It utilises deep learning techniques to generate human-like text responses given a prompt or a conversation history. In a recent publications by Perez *et al*. (2021), Zhang *et al*. (2022), Gao *et al*. (2021), Radford *et al*. (2018) agreed that there are six steps to ChatGPT. The six steps are pre-training, fine-tuning, model architecture, tokenisation, generating response and response ranking.

PRE-TRAINING:

ChatGPT is first pre-trained on a large corpus of publicly available text data from the internet. During pre-training, the model learns to predict the next word in a sentence based on the context of previous words. This process helps the model to learn grammar, facts, reasoning abilities, and some degree of world knowledge.

FINE-TUNING:

After pre-training, the model is fine-tuned on specific tasks using custom datasets created by OpenAI. For ChatGPT, these datasets consist of demonstrations and comparisons. Human AI trainers engage in conversations where they play both sides—the user and an AI assistant. They have access to model-generated suggestions during this process. The trainers also review and rate possible model outputs for a range of example inputs. This fine-tuning process helps align the model's behaviour with human values and makes it more useful and safer.

MODEL ARCHITECTURE

ChatGPT is built on the Transformer architecture, that is composed of multiple layers of self-attention and feed-forward neural networks.

Self-attention allows the model to weigh the importance of different words in a sentence when generating responses. This architecture enables the model to capture long-range dependencies and produce coherent and contextually relevant responses.

TOKENISATION:

Text input is tokenised into smaller units called tokens, that can be individual characters or sub words. Tokenisation helps the model process and understand text efficiently. Each token is assigned a unique numerical representation that the model uses for computation.

GENERATING RESPONSES:

When given a prompt or a conversation history, ChatGPT takes the tokenised input and passes it through its multiple layers. The model processes the input and generates a probability distribution over the possible tokens that can follow. The next token is then sampled from this distribution, and the process is repeated iteratively to generate a sequence of tokens that form the model's response.

RESPONSE RANKING:

In a conversation, ChatGPT generates multiple possible completions, and these completions are ranked based on their quality. The rankings help select the most appropriate and coherent response to present to the user.

CHATGPT IN ZIMBABWE UNIVERSITIES

Although ChatGPT offers several potential benefits and challenges, its efficacy in enhancing academic output has not been widely canvassed through research. However, there is scant published research about the experiences of students and lecturers in Zimbabwean Universities.

This research used the Technology Acceptance Model (TAM). TAM is a widely used theory in the field of information systems and technology adoption. The TAM was developed by Fred Davis in 1986 at the Sloan School of Management at Massachusetts Institute of Technology (Chuttur, 2009). TAM has gained significant recognition and is widely used and extended by researchers in the field of information systems and technology adoption. TAM seeks to explain users' acceptance and usage of technology based on their perceived usefulness and ease of use.

The TAM helps researchers and practitioners gain a better understanding of why users accept or reject a particular technology. By exploring factors such as perceived usefulness and perceived ease of use, TAM sheds light on the underlying reasons behind user acceptance or resistance, providing valuable insights into user behaviour. In addition, TAM helps to predict Technology Adoption, usage, assessing users' attitudes and behavioural intentions toward a technology. In addition, assist researcher to forecast whether individuals are likely to adopt and use it. This predictive capability is useful for organizations and developers when planning for technology implementation and adoption strategies. Furthermore, TAM guides the design and development of user-friendly technologies, provides insights into the features, functionalities, and user experience aspects that enhance technology acceptance and encourage adoption. It also help researchers to identify barriers, challenges that hinder technology acceptance and examining users' perceptions and attitudes. This information enables organizations to address these barriers proactively, improve user experience, and overcome resistance to technology adoption. Finally, TAM supports the development of targeted interventions and training programmes to facilitate technology acceptance.

STUDY DESIGN AND METHODOLOGY

This research adopted both quantitative and qualitative case study methodology as a research approach that offers several advantages. It allows for in-depth understanding by thoroughly exploring a specific case, context, or individual (Barada, 2013). This comprehensive examination provides rich insights and a holistic view of the research topic within its real-life context. The flexibility of qualitative case of the three selected universities allows researchers to tailor the approach to their research questions and objectives, selecting multiple cases or a single case and employing various qualitative techniques. Barada (2018; Hyett *et al*. (2017) proposed that triangulation is facilitated through the use of multiple data sources and methods, enhancing the credibility and reliability of the findings.

Table 3.1 Study sample

University	**Number of Lectures**	**Number of Students**	**Total**
University of Zimbabwe	3	3	6
Bindura University of Science Education	3	3	6
Zimbabwe Ezekiel Guti	3	3	6
Total	9	9	18

Nine lecturers and twenty-four students were selected from these three universities Purposive sampling was used to select the students and lectures and who have knowledge and used ChatGPT in doing their assignments and research.

The qualitative data collection process involves gathering information and insights through various methods to explore research questions and gain a deeper understanding of a phenomenon. The data from

students and lectures were collected through face-to-face interviews at all the university campuses. To enhance validity and reliability, (Hyett *et al*., 2014) proposed that the researchers should clearly have a defined research objectives, use established measurement instruments, conduct pilot tests, employed a purposive sampling techniques and used triangulation methods in collecting data.

The interviews were conducted with the full consent of the students and the lecturers. Furthermore, no compensation or remuneration was offered to any participant, and they were informed that they could choose to accept or decline the interview if they no longer wished to participate freely. A thorough orientation was provided to ensure that all participants understood the purpose of the research, and strict measures were in place to maintain anonymity throughout and after the study. All data collected was solely used for the purpose of this research. The students and lecturers were assured that confidentiality, anonymity, and privacy of the interviewees would be upheld, especially for vulnerable populations. There were no conflicts of interest between the researcher and the interviewees.

This research was carried out at University of Zimbabwe, Bindura University of Science Education and Zimbabwe Ezekiel Guti University. The findings of this research cannot be generalized to represent the situations in all universities in Zimbabwe.

FINDINGS

The widely uses of ChatGPT by the university students is represented in the bar chart below. The results show that most students use ChatGPT when doing their assignments and preparing the examinations.

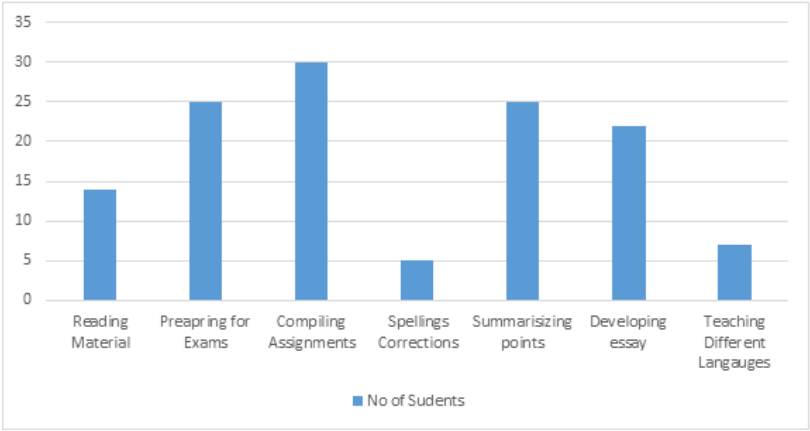

Figure 1: Uses of ChatGPT by Students

The widely uses of ChatGPT by the university students is represented in the bar chart below. The results how that most students use ChatGPT when doing their assignments and preparing the examinations.

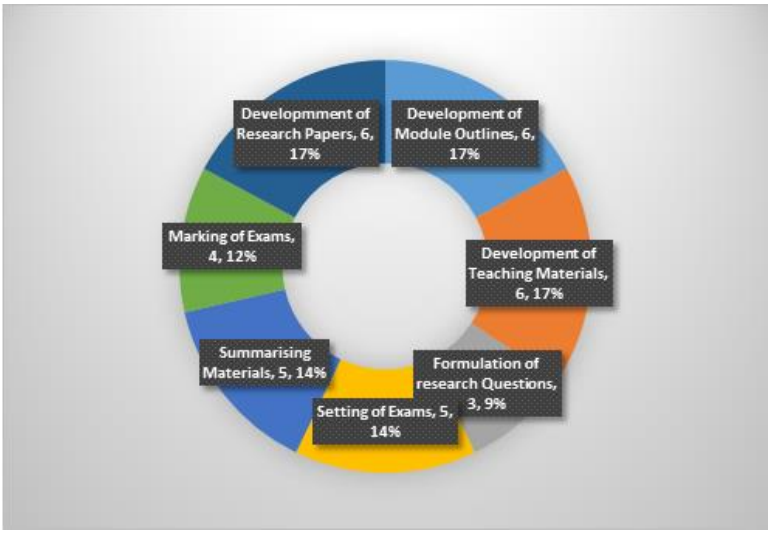

Figure 2

The results from the interviews, document analysis, observations, social media interviews and internet was groups into the following six categories: that are usefulness, challenges and recommendations to students and lecturers.

USEFULNESS OF THE CHATGPT TECHNOLOGY TO STUDENTS

The students narrated that ChatGPT is good, it helps them to find answers quickly, the use ChatGPT to find theories that usually take much time to read.

The students highlighted that ChatGPT is a valuable tool that assist by providing many academic materials. They narrated that

> "ChatGPT can answer questions, provide explanations, offer suggestions, and assist with a wide range of tasks".

This finding is in line with McGee (2023) and Najafali *et al.* (2023); also found in their studies that ChatGPT provided students and lecturers in universities with quick access to a wide range of information and resources, potentially enhancing their understanding of course material. This technology has the potential to enhance productivity and efficiency by providing instant support and guidance.

PREPARING FOR EXAMS

One of the students reveal that:

> "ChatGPT has access to a vast amount of knowledge and information, making it a valuable tool for information retrieval. It can quickly search and retrieve relevant information from a wide range of domains, including science, history, technology, and more."

This was also buttressed by Sullivan *et al.* (2023) who contend that in USA students can rely on ChatGPT to obtain accurate and up-to-date information.

COMPILING ASSIGNMENTS

All the students highlighted that ChatGPT can serve as an educational resource, supporting learning and knowledge acquisition. They explained that ChatGPT helps them to work complex concepts, provide step-by-step guidance, and offer clarifications on various subjects. Students and learners can engage with ChatGPT to supplement their studies and gain a deeper understanding of topics. This shows that ChatGPT is a valuable tool for students in university and they must be taught proper ways of using it.

SPELLINGS CORRECTIONS

One student argued that,

> "The ChatGPT helps in content generation and creative writing in assignment given. It can provide inspiration and suggestions for writing projects, help refine ideas, summarizing point and offer assistance with grammar and language usage."

This is similar to finding by Cotton *et al. (*2023), McGee (2023) and Najafali *et al.* (2023) who emphasise that creative students can leverage ChatGPT to overcome writer's block and enhance their writing process. This shows that In Zimbabwean universities, ChatGPT is a valuable tool for language practice and improvement. University students can engage in conversations with ChatGPT to enhance their language skills, receive feedback on their writing, and learn new vocabulary and expressions. Mogavi *et al.* (2023) and Newton & Xiromeriti (2023) also found that ChatGPT simulate real-life language interactions and provide a platform for language learners to practice in a supportive environment and it is a vital tool for university students.

The students appreciated ChatGPT capabilities, as one student said

> "ChatGPT helps us to compile essay when given point in a short period of time."

This shows ChatGPT technology has the potential to improve accessibility and inclusivity by providing assistance to individuals with disabilities or language barriers. It can also offer support to those who may face challenges in accessing information or communicating effectively. This was emphasised by Loc(2023) who proposed that ChatGPT's availability across multiple platforms ensures that its benefits can reach a wide range of users. In addition, it perceived that student can discover relevant literature, and assist with generating ideas for further investigation. ChatGPT's ability to process and analyse vast amounts of information makes it a valuable research tool or university students.

TEACHING DIFFERENT LANGUAGES:

The students appreciated ChatGPT capabilities,

> "ChatGPT helps us to convert an essay form one language to another langue in a short time."

This shows ChatGPT technology can act as an interpreter for example from English to Chinese on Spanish. This helps students to learn different language at their own, and to convert an essay form one language to the other easily.

The lectures applaud the ChatGPT technology. They disclosed that ChatGPT technology is helpful in answering questions instantly, facilitating active learning, provides additional explanations, generating teaching materials supporting course planning and language support.

DEVELOPMENT OF TEACHING MATERIALS

Lecturers highlighted that:

> "We use chatGPT to develop module outlines, teaching materials, and setting of exams, generating questions and to answer questions from students, both during and outside of class."

This shows that is a valuable tool in academia because it assists lecturers by providing quick answers to common queries, such as clarifications on course materials, assignment guidelines, or exam-related information. It is consistent with previous studies as found by Najafali *et al*. (2023) and Davenport and Najafali *et al.* (2023) who found that ChatGPT can help alleviate the lecturers' workload and provide timely responses to students. Therefore, lectures have to be trained to utilise chatGPT technology fully when executing their works.

While ChatGPT can offer numerous benefits to university students, it is important to be aware of its potential disadvantages. Here are some drawbacks to consider when using ChatGPT technology:

Relying solely on ChatGPT for answers and explanations may hinder the development of critical thinking skills in students. It is crucial for students to engage in independent thinking, analysis, and evaluation of information, rather than accepting responses at face value.

RISK OF INACCURATE OR MISLEADING INFORMATION:

I respectfully agreed with Najafali *et al.* (2023) ChatGPT generates responses based on patterns and data it is trained on, that may not always guarantee accuracy or reliability. There is a risk of receiving incorrect or misleading information, particularly in rapidly evolving fields where the training data may be outdated.

LIMITED CONTEXTUAL UNDERSTANDING:

ChatGPT may struggle with fully understanding the context and nuances of specific questions or situations. It may provide generic or incomplete responses that do not adequately address the specific needs or complexities of university-level studies. This is consistent with previous studies by Davenport and Najafali *et al*. (2023) who found that not all answers from ChatGPT are correct and they need to be verified by reading various sources of literature.

OVERRELIANCE ON TECHNOLOGY:

Depending excessively on ChatGPT for academic tasks can lead to a diminished reliance on personal research, critical thinking, and academic exploration. Newton & Xiromeriti (2023) provide evidence thatalign with my own findings, indicating that sstudents should be encouraged to actively engage with scholarly resources, engage in discussions with peers and instructors, and develop their own analytical skills.

ETHICAL CONSIDERATIONS:

ChatGPT technology raises ethical concerns regarding authorship and plagiarism. This concurs with Mogavi *et al*., Newton and Xiromeriti (2023) who cautious about using ChatGPT to generate content for assignments without proper attribution or acknowledgment. It is important to understand academic integrity principles and ensure that the use of ChatGPT aligns with ethical guidelines.

LACK OF PERSONALISED FEEDBACK

While ChatGPT can provide general guidance and information, it may not offer personalised feedback tailored to individual learning needs. Students may miss out on targeted feedback and specific areas for improvement that can be provided by instructors or mentors.

POTENTIAL BIAS AND LACK OF DIVERSITY

ChatGPT is trained on large datasets, that may inadvertently introduce biases present in the data. This can result in biased or skewed responses, reinforcing existing societal biases or prejudices. Students should be aware of these limitations and exercise critical thinking when evaluating the information provided.

REDUCED INTERPERSONAL INTERACTION

Overreliance on ChatGPT may result in reduced interpersonal interaction and communication. The results obtained by McGee (2023)

and Najafali *et al.* (2023) resonate with my own findings that students to engage in face-to-face discussions, collaborate with peers, and seek guidance from instructors to foster social and communication skills.

CONCLUSION AND RECOMMENDATIONS

The use of ChatGPT in universities presents several challenges and benefits. However, the following recommendations if applied can enhance successful integration of ChatGPT technology in universities in Zimbabwe.

Verify and cross-reference information: While ChatGPT can provide quick answers, it is important for students to verify the accuracy and reliability of the information provided. Cross-reference the information with reputable sources or consult with instructors to ensure the validity of the responses.

Use it as a learning supplement: View ChatGPT as a supplemental resource rather than a primary source of information. Use it to gain additional insights, clarification, or alternative explanations to complement your learning materials and discussions.

Engage in critical thinking: Apply critical thinking skills when using ChatGPT. Evaluate the responses, consider potential biases or limitations, and think critically about the information provided. Challenge assumptions, ask follow-up questions, and seek additional perspectives to deepen your understanding.

Seek human guidance: While ChatGPT can provide assistance, remember that human guidance and expertise are invaluable. Engage with your lecturers, classmates, or subject matter experts to discuss complex topics, seek clarifications, and receive personalised guidance. Use ChatGPT as a starting point for further exploration and discussion.

Provide feedback: If you come across incorrect or inappropriate responses from ChatGPT, provide feedback to the developers or platform administrators. This helps improve the model's performance and ensures the delivery of more accurate and reliable information to future users.

RECOMMENDATION TO LECTURES ARE:

Communicate the limitations: Lecturers must educate students about the limitations of ChatGPT technology. Make them aware that it is a tool that complements learning but has inherent constraints. Clearly communicate the role of ChatGPT and emphasise the importance of critical thinking, independent research, and human engagement.

Guide students in using ChatGPT effectively: Experts should provide guidelines on how to use ChatGPT as a learning resource. Teach students how to ask effective questions, evaluate responses critically, and cross-reference information. Encourage them to seek human guidance and engage in thoughtful discussions.

Curate and supplement information: Curate a list of reliable resources and references that support the curriculum. Encourage students to use ChatGPT alongside these resources to gain a broader understanding of the topics. Supplement ChatGPT's responses with your expertise and provide additional explanations when necessary.

Promote active learning: Encourage students to actively engage with the information provided by ChatGPT. Challenge them to think critically, ask follow-up questions, and seek deeper understanding beyond the initial response. Incorporate ChatGPT as a discussion tool, prompting students to evaluate and debate the information it provides.

Monitor and assess usage: Monitor how students use ChatGPT and evaluate its impact on their learning. Assess the effectiveness of

ChatGPT in addressing their queries and supporting their understanding. Use this feedback to refine your teaching strategies and adapt the use of ChatGPT accordingly.

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