

TITLE

**GenAI: Elevate excellence but maintain integrity in science
education in Samoa**

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ABSTRACT

Globalization, digital transformation and the rise of generative AI (GenAI) are reshaping the education landscape in the Pacific including Samoa. The unauthorized application of GenAI by students is a concern to the university, yet it is well known for its ability to promote personalised learning, improve educational experiences, increase student engagement and support high quality assessment presentations. While Samoan language is predominantly spoken in both formal and informal educational contexts, English is used when it comes to assessments at the National University of Samoa. With language difficulties and ongoing literacy issues, university students utilized GenAI to assist in improving academic writing as well as classroom presentations.

However, challenges identified in this presentation included overreliance, ethical and pedagogical implications, emphasizing the need for proper guidelines and policies to ensure responsible use of the technology. While GenAI has the potential to transform and improve excellence in education, its benefits will only be fully realised if it is implemented responsibly and equitably.

This presentation explores the experiences of postgraduate students registered in the course HTE580: Issues in Science Education at the Faculty of Education, National University of Samoa.

Keywords:

Science education, GenAI, quality education, academic writing, ethical implications

INTRODUCTION

The evolution of Generative Artificial Intelligence (GenAI) started in the 1950s involving two important conceptions, generative and artificial intelligence. Generative is simply creating new content that the computer can synthesize and produce new things/content. These new content for example include audio, computer codes, new images, text (email, or an essay), or video. Artificial intelligence (AI) refers to a computer programme doing the job that a human would do but in a much quicker timeframe. GenAI evolved from theoretical concepts to more sophisticated multimodal systems that are shaping industries and redefining human-AI interactions in education as emphasise in this exploration.

GenAI is having a significant impact on sectors like healthcare, manufacturing, the media and education. GenAI is recognized in this presentation as the ability of machines to perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language understanding (Russell & Norvig, 1995). Recent advances in GenAI and large language models (LLMs) have attracted even broader societal attention (Leander & Burriss, 2020). This is because LLMs are GenAI systems or tools that are capable of generating and processing tasks such as language generation. One example of these tools commonly used by university students is Chat Generative Pretrained Transformers (ChatGPT). Since its debut in November 2022, ChatGPT has attracted global attention as it holds immense implications across various domains, including language teaching and learning. For example, the advent of the Internet and search engines has transformed the language learning landscape, as it drastically reduces the reliance of students on teachers, allowing students to access vast amounts of information, language resources, and language learning platforms that cater to their individual learning needs. Moreover, ChatGPT is an AI chatbot with advanced natural language processing (NLP) that allows the user to have human-like conversations to complete various tasks.

The penetration of GenAI into the realm of education in Samoa is reshaping the way knowledge is shared and absorbed by university students. This is because technology has shown its capacity to independently create content at the forefront of educational progress offering a move towards more personalized and interactive learning settings. The essence of this evolution lies not in the technology itself but in its potential to democratize and tailor education making learning experiences more attuned to university students' requirements and preferences.

Fundamentally GenAI serves as a driver for change by providing tools that can transform teaching approaches and learning methods. The influence of GenAI on education goes far beyond technological progress, it signifies a transition towards an era where learning emphasizes not just rote memorization but also profound comprehension and creativity. It prompts educators to rethink their roles and adjust to an environment where GenAI tools support the development of inclusive and personalized learning experiences. Yet embracing this evolution necessitates an examination of the possibilities brought by GenAI along with the ethical and practical dilemmas that come with its integration into educational systems. Around the world, many students already use GenAI in various ways, such as summarizing and paraphrasing text, organizing their schedules, assisting with homework, and understanding difficult concepts. For instructors, this can be both a challenge and an opportunity. While there are valid concerns about GenAI and academic integrity, it also has the potential to enhance research skills, foster creativity, and develop critical thinking.

The exploration of GenAI in this presentation commences with recognizing its potential to revolutionize traditional learning approaches. It sparks conversations about the ways GenAI can enhance educational objectives, the obstacles that could hinder its adoption and the strategies for overcoming these challenges. As we delve into this journey the emphasis in this presentation is to

uncover the relationship between GenAI and science education striving to offer insights to promote excellence but at the same time maintain integrity amongst students registering in the course HTE580.

Course background

HTE580 is a postgraduate course in the Postgraduate Diploma of Education (PGDE) programme at the Faculty of Education (FOE), National University of Samoa (NUS). It introduces learners to the key issues within the field of science education relating to teaching, learning, assessment, curriculum, as well as research in science education. In particular, issues relating to the science teacher, the science learner, the science curriculum, and the science classroom assessment practices. The course has an international perspective, but it also looks at problems and issues that are of particular concern to Samoa. The knowledge acquired from this course encourages the learners to grasp critical issues within the field of science education and use it to inform possible research investigations in the area and to inform classroom practices, in early childhood education (ECE), primary, and high schools as well as tertiary levels. To enter the PGDE programme, a student must have a “bachelor of education degree from a recognized university” (NUS Calendar, 2024, pg. 154). Therefore, this course (HTE580) includes mainly adult learners from all levels of education (ECE, Primary, High Schools, and university).

Assessments in this course are written assignments including essays, research projects, and case studies or annotated bibliographies using the English language. Therefore, the students are expected to develop proficient academic writing skills to be successful in this course. Acquiring academic writing proficiency entails not only mastering the technical and formal aspects of the genre, such as using source references and citations but also the ability to think in more abstract terms, such as reflecting critically on vocabulary choice and language usage within their academic journey.

Rationale of the study

The focus of the exploration is in two folds. The first looks at the roles of GenAI in promoting excellence in the teaching and learning of the HTE580 course. Academic excellence emphasized in this presentation goes beyond rote memorization, educational assessments, and writing grammatically correct sentences; it encompasses a conceptual understanding of topics, analytical thinking abilities, and a passion for quality learning. The second fold looks at an awareness of using GenAI outside assessment guidelines as it constitutes academic dishonesty. It is the student’s responsibility to be clear on the limitations of its use for each assessment and to be clear on the expectations placed upon them in each of the assessment tasks and to do appropriately.

Exploring the experiences of university students in HTE580, this research seeks to illuminate the complex interplay between striving for excellence in assessment tasks but maintaining integrity in science education in Samoa.

Proposed outcomes

The aim of this study is to provide a comprehensive analysis of the experiences of university students registered in this course about the role of GenAI in their studies. It also seeks to uncover challenges such as academic dishonesty and unethical use of GenAI. The outcome of the study will contribute to a deeper understanding of how GenAI influences the teaching and learning of HTE580, offering insights into developing proper guidelines and policies to ensure responsible use

of this subset of artificial intelligence technology. It is hoped that the findings will activate some deliberations at the university level to look into the benefits of GenAI in elevating excellence.

LITERATURE REVIEW

GenAI has been increasingly affecting higher education, as it has the potential to enhance learning experiences and create new opportunities for innovation in educational practices (Dempere *et al.*, 2023; Grassini, 2023). It encourages students to ask questions, clarify their needs, and delve into various topics as a self-regulated learning approach (Chiu, 2024; Cooper, 2023; Wu *et al.*, 2024). Teachers, students, and experts have acclaimed the impact of Generative AI in education in reshaping teaching and learning approaches. The significant benefits of improving schoolwork productivity drive more investment in GenAI solutions for education. Reports suggest that the application of GenAI technologies in the education market is expected to grow 39,5% from \$299,8 million in 2023 to \$7,701.9 million in 2033 (Reyes & Popof, 2023). This confirms that the trend for GenAI adoption in education shows positive signs, with various teachers, pupils, and students applying it to their work.

Within these discussions, GenAI can be viewed as a partner in education, helping students develop not only technical proficiency but also the critical thinking, problem-solving, and ethical decision-making skills needed in a rapidly changing world. The review of the literature concerning improving educational excellence but maintaining integrity in education is organised in four common conditions that demonstrate the significant roles of GenAI concerning the focus of this exploration. The four conditions include:

- i. Personalised learning*
- ii. Assessment for academic writing*
- iii. Adult learners' literacy*
- iv. Second language development*

With the limitation of local research on GenAI, the four conditions are discussed below, along with supporting evidence from international literature.

Personalised learning

Since the arrival of formal education in Samoa in the 20th Century, classroom teaching methods have constantly changed although traditional strategies were predominantly used. Studies have found that traditional training methods often lead to disengagement and low retention due to their inability to cater to individual (personalised) learning needs (Dobbs, 2008; Knight & Wood, 2005; Lord, 1999; McManus, Dunn & Denig, 2003). However, the rise of GenAI revolutionizes learning by enabling learning experiences tailored to the student's needs, goals, and abilities (Shemshack & Spector, 2020; Grant & Basye, 2014; US Department of Education, 2017). It recognizes the existence of different types of learning styles and preferences which are accommodated by proven relevant, effective, and appealing strategies. Technology and research-based studies have contributed to the noticeable increase in the use of personalised learning methods (Grant & Basye, 2014). This is because personalised learning is a teaching model built on the idea that students have diverse learning styles and progress at different rates. In Samoa, teachers play a key role in this process and much of the learning that occurs is viewed as a direct result of the teachers' instruction aiming at accommodating different learning styles, encouraging discussion, and promoting inquiry and problem-solving (Ministry of Education Sports & Culture, 2006). Unlike this one-size-fits-all traditional teaching method, personalised learning expects

teachers and students to work together in designing lessons based on individual student's interests, learning abilities, and preferences (Goodfellow, Bengio & Courville, 2016). Personalised learning in this sense can be referred to as learner learner-centered learning approach since its focus is prioritizing individual student needs in educational decisions, leading to improved educational outcomes (Taber, 2011).

GenAI technology can analyze student learning preferences, performance metrics, and engagement levels to create personalised materials that are suitable for each student and current knowledge level. For instance, the quiz system and the assessments are personalised in ways that become more difficult as students become more proficient in the subject matter. Not only that, GenAI may also develop personalised learning paths, integrating the content with learner's interests, objectives, and learning styles. This approach leads to increased student engagement and motivation since the students are more likely to be enthusiastic and active participants when the educational material aligns with their interests and goals (Suaalii & Tufuga, 2024). In science education, this kind of approach is critical because it not only boosts engagement and retention but also transforms traditional training methods into more effective and immersive learning experiences (Bulger, 2016; Suaalii, 2013).

Personalised learning also plays a crucial role in promoting self-regulation and independence among students, encouraging them to take an active role in their AI learning journey. By setting personal goals and engaging in reflective practices, students develop a sense of ownership over their learning, which is essential for navigating the complex and rapidly evolving field of AI. Furthermore, the inclusivity of personalised learning ensures equitable access to AI education for students from diverse backgrounds, including those who are traditionally underrepresented or at-risk in the field of science and technology (Deng *et al.*, 2018). Studies stated that technology-assisted learning has been promoted as an innovative education practice because it has the potential to enhance teaching and student's learning experience, which ultimately leads to better student learning achievement (Rubach *et al.*, 2022; Sanfo & Malgoubri, 2023). It also contributes to maximizing access to education and mitigating educational inequity in many contexts (Suaalii, 2024).

The importance of personalised learning is underscored by research indicating increased student satisfaction and confidence, which are key to fostering a positive learning environment and preparing students for the challenges of a future where AI plays a significant role. Zhang, Basham and Yang (2020) provided a comprehensive understanding of the current research efforts on the implementation of personalised learning across education [learning sciences, computer science as well as information science] and their impacts on educational outcomes. The authors stated that education systems across the globe are making efforts to personalize learning in hopes of addressing increasing student diversity and providing quality education for all students. Thus, implementing personalized learning strategies, educators can make significant strides in achieving AI Literacy for All, ensuring that students are not only consumers of AI technology but also informed participants in its development and application (Tadimalla & Maher, 2024).

Assessment for academic writing

Integrating GenAI into assessments involves assessing the impact of GenAI on the validity, reliability, and integrity of educational assessments. This process is crucial to ensure that the technology enhances rather than undermines the assessment process. Importantly, this stage emphasizes educating students on the ethical use of GenAI and its role in their education, to

support a responsible learning environment. The literature suggests that GenAI can be a very useful tool to help improve both general and academic English (Hale *et al.*, 1996; Aldabbus & Almansouri, 2022). It can be used to check the correctness of written or spoken work, give feedback on English, and as a tool to help develop an understanding of grammar and improve vocabulary range. GenAI in this sense can be used to help prepare for different academic situations where language can be a challenge (Črček & Patekar, 2023).

At the university level, students are expected to demonstrate quality academic writing that includes specific writing processes, structures, and characteristics that support their academic performance. With such a level of academic the students can exercise their critical thinking skills, demonstrate their knowledge, and advocate for their unique exploration of a topic to persuade their lecturers to accept their findings or conclusions (Swales & Feak, 2012). However, research shows that university students often struggle with writing and are additionally burdened with language barriers and unfamiliarity with Western writing genres (Badenhorst, Moloney, Rosales, Dyer & Ru, 2015; Bawarshi, 2016; Gonzales, 2015; Shang-Butler, 2015). Although most academic writing assignments at the university level are the same as they used to be such as literature reviews and research proposals, academic writing is changing rapidly in an increasingly globalized world. For instance, newer assignments such as reflective writing, case study narratives, and problem-based projects. Nevertheless, academic writing tends to support student engagement in the learning process, allowing students to learn different ways of constructing knowledge (Palmer, 2008; Peters, 2010; Hyland, 2014).

Vygotsky (1987) explained that writing is one of the most complex formats for humans to learn. He wrote, "... even the most minimal development of written speech requires a high degree of abstraction... the result is that psychological conditions characteristic of written speech are very different from those of oral speech ..." (p. 202). Similarly, Gonzales (2015) explains the difficulty students face navigating academic writing. English as a Second Language (ESL), the students agree that academic writing presents an extra challenge of expressing themselves in a second language which can inhibit their ability to effectively convey their ideas and incorporate various viewpoints in their writings (Yasuda, 2004; Fanene, 2007; Huang *et al.*, 2023; Zhang, 2023). Certainly, ESL students encounter difficulty in consistently applying grammatical, spelling, and notational standards in addition to structural and organizational norms. In many cases, these standards differ across academic communities/faculties that have developed their processes for knowledge-sharing and consensus-making or within sub-genres such as academic essays, literature reviews, or dissertations (Hyland, 2014). Academic writing should generally be concise, free of grammatical, notational, and spelling errors, and often follow a common structure and organizational patterns (McKinley & Rose, 2018).

Despite their difficulties and challenges, university students still have to find ways to improve their academic writing as required in their assessment guidelines. Today, research states that these challenges create opportunities for technology through GenAI to address and provide support for students in their writing and learning (Pineteh, 2014; Lin & Chang, 2020; Gupta *et al.*, 2022; Salvagno, Taccone & Gerli, 2023). In addition, GenAI can serve as a proofreader and support students in ensuring that their grammar and spelling are correct so that they can submit a polished final product (Malik *et al.*, 2023). Recent research exploring how students interact with GenAI tools such as ChatGPT has shown that many university students are already using GenAI, specifically using it to proofread their assignments (Črček & Patekar, 2023; Singh, Tayarani-Najaran & Yaqoob, 2023), and it was found to be comparable to humans' execution of the same task (Heintz *et al.*, 2022).

Adult learners’ literacy

Adult learners, as emphasized in this study, are a diverse group – typically aged 25 and older – that bring into the university a wide range of cultural and educational backgrounds, abilities, responsibilities, and experiences (Hollander *et al.*, 2023). Most of them return to tertiary education for professional reasons such as teaching at higher levels or opportune for higher positions. With the level of education that they received five or more years ago, they often find current educational standards and expectations very challenging. The availability of technological tools such as GenAI seems to offer a unique opportunity to support and personalize their learning experiences, fostering independence and enhancing educational outcomes (Hsu & Ching, 2023). Moreover, the ability of GenAI to provide hands-on activities and interactive experiences to promote deeper conceptual understanding (Salinas-Navarro *et al.*, 2024). Similarly, other GenAI tools such as ChatGPT can enhance the overall learning experience of adults (Lin, 2023) and many of them are actively engaged in using it (Chiu, 2024). A survey involving 400 adult educators found that over 75% of the respondents acknowledge the potential of GenAI to support adult learning and education in content creation and as a teaching tool (Cacicio & Riggs, 2023).

In this GenAI era where adult learners are expected to gain multiliteracy skills, GenAI tools such as ChatGPT can help in adult literacy development (Ciampa, Wolfe & Bronstein, 2023). It can be used for improving the reading, writing, critical thinking skills, and self-directed learning of adult learners. In addition, GenAI has the potential to expedite the rapid creation of high quality, personalised and engaging materials for the purposes of instruction and assessment experiences that resonate with learners’ intrinsic motivations (Albayati, 2024). This is critical to the people and the development of Samoa because a lack of literacy skills can adversely affect adults’ chances of gaining higher qualifications, being employed, earning a good income, and helping their children succeed in education (Earle, 2009). Researchers (i.e., Appleby & Bathmaker, 2006; Pannucci & Walmsley, 2007), contend that being literate and being able to read are substantial foundation blocks for capable and independent citizenship (Reardon, 2010). Adarkwah (2024, p.3) summarized “GenAI examples and their potential application in adult learning” (Table 1).

Table 1: GenAI examples and their potential application in adult learning

<i>Examples</i>	<i>Application in adult learning</i>
ChatGPT	Improve reading, writing, critical thinking skills & self-directed learning
Synthesia	Generate instructional video content
Midjourney	Create realistic images to enhance the immersive learning experiences
Dial-E 2	Automate assessment & instruction and enhance creativity
InstructGPT	Answer questions & create customised learning materials
Perplexity	Provide knowledgeable hub for seeking accurate answers tailored to their needs

(Adarkwah, 2024, p.3)

Despite the potential benefits offered by GenAI technologies, how adult learners will apply GenAI technologies to achieve their educational and professional goals remains blurred. Many adult learners encounter challenges when adapting to unfamiliar technologies. This results in missed opportunities for adult learners to upskill and adapt to technology-mediated environments. In addition, it is important to be alert of its potential dangers to educational quality to be able to

fully harness its benefits. For example, Tili *et al.*, (2023) call for a cautious approach to integrating GenAI tools such as ChatGPT into education because of its ability to encourage plagiarism and

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cheating, overreliance, dishonesty, and its tendency to provide misleading or inaccurate information (Dwivedi *et al.*, 2023).

Second language development

The potential of ChatGPT extends to various facets of language education that offers opportunities for language practice. This includes the development of vast amounts of text in natural language (i.e. English), that ultimately facilitates reading, writing, and language acquisition (Tseng & Warschauer, 2023). Through interactions with AI-generated content, students can enhance their vocabulary, grammar, sentence structure and comprehension skills, contributing to overall language proficiency (Lee *et al.*, 2024). Personalising learning experiences involves an analysis of learners' interactions and adjusts content and exercises to their proficiency level, learning style, and interests, thereby providing tailored recommendations and feedback in real-time (Carlson, Pack, & Escalante 2023; Kasneci *et al.*, 2023). In this regard, GenAI functions as virtual tutors or language assistants, offering on-demand support, explanations, and guidance to learners who are experiencing difficulties in natural language (English). For instance, ChatGPT simulate language interactions, enabling students to engage in conversation, seek clarification, and practice language skills (Ulla, Perales & Busbus, 2023). At the same time, these systems can help learners expand their vocabulary and improve their sentence structures by providing suggestions for alternative word choices and sentence rephrasing (Roe, Renandya & Jacobs, 2023). GenAI tools such ChatGPT and Large Language Models (LLMs) predict and generate sequences of words based on the users' instructions.

GenAI has the potential to transform language teaching and learning, but it must be integrated responsibly and ethically. We believe that the role of teachers remains indispensable, as they bring invaluable expertise and personalised guidance to learners. Sometimes, LLMs can be susceptible to creating inappropriate and/or inaccurate content, and their outputs can display bias (Tafazoli, 2024). They can also invent 'facts', known as hallucinations. Because of this, there is currently a need to maintain expert professional input, whether from a teacher, a publisher or assessment specialist, to monitor and edit outputs to ensure suitability and integrity. Tafazoli (2024) stated that GenAI tools can help learners in many ways, but they cannot replace the support and insight which a skilled teacher brings to any learning context. It is therefore important to note that while GenAI has the potential to transform and improve excellence in various areas of education, its benefits will only be fully realised if it is implemented responsibly and equitably.

METHODOLOGY

Since the focus of the study is on understanding the experiences of university students with GenAI, the study is primarily qualitative with a small set of quantitative achievement data indicating the outcome of the assessment tasks. The selection of a qualitative approach for this study ensures that it is a situated activity that locates the researcher in the real world (Denzin & Lincoln, 2011). This enables the researcher to explore the workings of the case (Stake, 2005), and to understand the situations in their uniqueness (Creswell, 2007), as part of a particular context and the interactions occurring within their real world (Denzin & Lincoln, 2011).

Research questions

The questions that guided this exploration are:

1. What are university students' perceptions of GenAI?

2. How can GenAI be used to elevate excellence in HTE580?
3. What are the considerations when using GenAI tools in HTE580 course?

Methods of data collection

Qualitative data collecting method adopted in this study include interviewing. In particular, semi-structured interviews involve data collection through direct verbal interaction between the researcher and the research participant. It allows the researcher to gain insights into participants' perspectives on the phenomenon under study. Due to the nature of this tool, it allows new questions to be introduced and offers opportunities to probe deeper into the “situation at hand, to the emerging worldview of the participants and new ideas on the topic” (Merriam, 2009, p. 90).

One of the main ingredients of an interview is listening or being very attentive to what the interviewee is saying or even not saying. It means that the interviewer is active without being too intrusive (Denzin & Lincoln, 2011). But it also means that just because the interview is being audio recorded, the interviewer cannot take things easy. An interviewer must be very attuned and responsive to what the interviewee is saying and doing (Merriam, 2009). This is also important because something like body language may indicate that the interviewee is becoming uneasy or anxious about the line of questioning (Draper & Swift, 2011; Tufford & Newman, 2012). An ethically sensitive interviewer will not want to place undue pressure on the person they are talking to and will need to be prepared to cut short that line of questioning if it is a source of concern (Merriam, 2009).

Research participants

A total of 8 university postgraduate students agreed to participate in this study. The 8 research participants were from across three different semesters because there was often a low number of candidates registered for this course as well as in the PGDE programme. The research participants were reminded to use the language that they were comfortable with to express their perspectives during the data collection. This was used to ensure that the research participants were able to share their perspectives with confidence. Table 2 below provides demographic information as well as the identification of the research participants in this study. The confidentiality of the participants in the dissemination of the data was ensured by using the identification codes as in Table 2.

Table 2 : Demographic information of research participants

<i>Research participants codes</i>	<i>Semester, Year</i>	<i>Gender</i>	<i>Age group</i>	<i>Identification</i>
Student 1	2, 2023	F	30-34	S 1
Student 2	2, 2023	M	40-44	S 2
Student 3	1, 2024	F	30-34	S 3
Student 4	1, 2024	F	25-29	S 4
Student 5	1, 2024	F	30-34	S 5
Student 6	1, 2024	M	40-44	S 6
Student 7	2, 2024	M	25-29	S 7
Student 8	2, 2024	F	35-39	S8

Data analyses process

Thematic analysis used in this study is a widely used method in qualitative research that involves audio transcribing, identifying, analyzing, and reporting patterns, themes, or recurring

ideas within a dataset (Braun & Clarke, 2006). Essentially, it is a flexible and systematic approach that allows the researcher to uncover meaningful insights and understandings from the rich, often narrative data collected in this qualitative study. Thus, the goal of thematic analysis is to distill and organize the data into coherent themes that capture the essence of research participants' experiences, perceptions, or perspectives. The four themes generated include:

- i. ***Quality of submissions***
- ii. ***Adult learners' literacy***
- iii. ***Honesty—Samoan core value***
- iv. ***Students' voices***

FINDINGS AND DISCUSSIONS

Each of the four themes identified in the data analyses are discussed in subsequent sections with the support of the data collected from the research participants.

Quality of submissions

Assessment document in measurable terms the knowledge, skills, attitudes and beliefs that makes it an important component of the teaching-learning process at all levels of education. It determines the way in which we teach and what teaching methodologies we use and what innovation we have introduced in the teaching methodologies. But assessment is not just about grading and examinations. It is also about getting to know the students and the quality of their learning and using this knowledge and understanding for their benefit particularly in their submissions. In this regard, assessment is one of the major 'drivers' of the teaching-learning process at all levels of education. In HTE580 the candidates must prepare quality submissions for each of the required assessment tasks. These are all written assignments including classroom activities, essays, research projects, and case studies or annotated bibliographies using the English language

The analysis revealed various challenges faced by the research participants while working on individual assessment tasks throughout the semester.

"... very challenging tasks ... require a lot of critical, analytical thinking ... it's all application of knowledge, theories and ideas to what we are doing today ... and when it comes to writing using English, it is even harder to write our ideas in order to meet the requirements/criteria ... our lecturer is also a very hard marker, he looks at everything in the assignment, words, punctuations, references, sentences, paragraphs, he is very strict ... so I try my best, but a lot of red marks" S2.

"it's tough at postgraduate level, as it is all about writing, our lecturer always talk about academic writing, proper presentations of ideas and arguments in grammatically correct sentences ... its slowly improving, but still needs a lot of practice is needed" S4.

"finding the appropriate words and writing proper sentences for this level is always challenging ... our major research project is about 10,000 words ... e alu se kaimi o kau mafaufau gi upu palagi [takes a long while to think of English words] ... I wish we can use Samoan language in our writings ... hahaha" S5.

“I always get this comment from the lecturer, ideas are not flowing well ... I try to connect sentences and ideas ... but don't seem to work ... then at times I asked my daughter, and she came up with very nice paragraphs, in English very fast ... she said it was a computer app that can help us with our writing ... 14 weeks is not enough for us, second language learners to achieve the level that is required by our lecturer” S6.

“the time allocations for our major tasks are too short, we time to read, translate, think/make sense/analyse (in Samoan), translate to English, write sentences one by one, takes a long time, but we're only given few weeks ...” S7.

The effects of these challenges contribute to the quality of the submissions. Because of the high level of difficulties they faced, the research participants often produce written assignments of poor quality. For instance, S1, S5, S7 and S8 respectively stated that:

“90% of my class activities are marked down because of poor written English ... I was told that these simple activities build up our writing skills, thinking skills ... English ... but my essay and research project were not good at all”

“writing in English is always a problem for me ... e alu se kaimi o kau mafaufau gi upu palagi [takes a long while to think of English words] although I tried, but I feel that my writings pulls down my marks for every assignment, I wish we can use Samoan language in our writings ... hahaha”

“the time allocations for our major tasks are too short ... with my English language deficiency, I will never be able to produce a good essay, or research report”

“The more red marks, crosses and comments I see in my assignments, the more uncertain I become about the future of my journey in this course. Because I didn't seem to see any improvement at all ...”

Despite multiple perceptions about the challenges and poor qualities of assignments revealed in the study, all of the research participants completed the course in their respective semesters. The analyses revealed that more than half used computer applications, GenAI tools or ChatGPT to help them write in English, study more efficiently and increase the factual and technical accuracy of their work. They rely very much on technological tools to find information about their subjects, to develop their understanding of key concepts, and to generate new ideas. Basically, they stated that:

“my cousins from NZ showed me how to do the ChatGPT on my laptop last year ... so we tried it many times ... this course encouraged me to use it because we write so much and our lecturer always pick up many problems with my English writings ... my assignments look so professional with well-written sentences, paragraphs arguments and examples generated by the app ... somehow our lecturer seems to notice the variations between some of my writings ... I do tell him that I use ChatGPT, however there are some areas that the lecture is able to pick up” S1.

“our HTE580 lecturer is very busy delivering the content of the course, but very limited time to help with our writing ... he gives advices and comments here and there but he is expecting high standard, high quality English word, sentences, paragraphs, ideas, discussions ... so constructing proper sentences, permission should be granted

upon the use of ChatGPT ... why not, I am sure the lecturers know how useful it is for learning, writing our assessment tasks, improving the quality of our writing in English” S3.

“I use ChatGPT to write some ideas for me ... then I take it to the Students Support Services (SSS) for proof reading ... I used it (ChatGPT) a lot now to improve my assignments ... but I know it is not permitted in our studies ... our lecturer talks about plagiarism, so I have to be very careful to ensure that I do not get caught ... but it really helps my writing, thinking and learning” S4.

“I asked my daughter, and she came up with very nice paragraphs, in English very fast ... she said it was a computer app that can help us with our writing” S6.

“we should utilize the technology more often now, not only to deliver university (online) courses but as a tool to support our learning also ... it’s a lot quicker to produce what is required in the assignment ... we just have to check and make sure the content is relevant” S7.

“well in this digital era, we have so many technological tools available for free. We don’t have to pay money for a simple service ... I feel that the university should look at allowing us to use these apps. Very helpful, I get a lot of work done, new ideas ... proper sentences, new words that are relevant to what I want to write” S8.

More than 70 percent of the research participants agreed that GenAI tools offer various ways to support the development of their assignments and eventually align with the principles of Assessment for Learning. In this regard, the assessment for learning process can unlock the approaches used by students and help them to become more aware of not only what they are learning, but how they are learning it. This empowers students to take control of their own learning, by developing their skills of self-regulation (Zimmerman & Schunk, 2011). Three fundamental forms of self-regulation suggested by Zimmerman and Reiserberg (1997) include environmental, behavioral, and covert or personal. They argued that these triadic forms of self-regulation interact reciprocally via a cyclic feedback loop that allows writers to self-monitor and self-react to feedback about the effectiveness of specific self-regulatory techniques or processes (Zimmerman & Reiserberg, 1997).

The study revealed that the research participants were able to proactively evaluate their performance and adopted GenAI to improve their own learning as well as the quality of their submissions. In a rapidly changing world, successful individuals must be life-long learners who are metacognitive and able to effectively evaluate their learning. With extensive influences of globalization and technology upon Samoa, expectations and standards of education system continues to be of high level. Thus, students without the ability to focus their attention and maintain perseverance will be constantly pulled left and right by their immediate impulses. Furthermore, students who fail to learn self-evaluation strategies will not be able to effectively direct their attention towards the areas that need it the most. Fortunately, the research participants utilized GenAI tools although they realised that its use is not permitted by the university.

Adult learners' literacy

The demographic details (table 2) of the research participants clearly indicate that 100% are adult learners. Although adults tend to have a multitude of cultural and educational backgrounds, abilities and responsibilities, university studies may raise some challenges (i.e., literacy) because they have been away from formal classroom context for a number of years. When asked about the level of literacy in this course, S1, S2, S3, S5, S6 and S8 highlighted that literacy in Samoan (first, home) is very high as opposed to English (second) language. An analysis of the age group revealed that ≥ 30 years of age tend to be well versed with native language—Samoan. They are good because they were exposed to inherent and informal methods of learning their language at an earlier stage than their second-language counterparts (Prophet & Badede, 2009). Therefore, they have an advantage of learning to apply rules of syntax early in life and continuously develop into higher levels of literacy in such language. This knowledge of application of rules of syntax is said to lead to the ability to 'chunk' language text. Words forming units or chunks according to the rules of syntax also form units of meaning (Howe, 1970; Pearson, Moje, & Greenleaf, 2010). For these research participants, it is obvious that they have poor knowledge of such rules in the second language (English) and therefore they are disadvantaged of being less able to see meaning in texts. In contrast, S4 and S7 stated that:

"I am ok, I can read and understand English literature and our science notes ... my writing is improving a lot with the help of free technology tools, like ChatGPT ... practice, practice, more practice ... I can confidently say 70%" S4.

"I think it's all about using technology and digital resources more often ... I spend a lot of time on the Internet searching and looking at other materials ... because there is no other way to improve in this course (at this level) ... be literate is the key, and our lecturer keeps on telling us to seek help to improve our academic writing etc ... so right now I can say that I am ok ... average level I think" (S7).

The analysis revealed that the research participants with < 30 years of age consider their literacy level average and above. Obvious reasons from their responses clearly indicated the influence of technology upon their learning. If constant practice and frequent use of these technological tools it is possible that the students tend to learn new ideas, improve or develop specific skills.

Winch *et al.*, (2014) define literacy as making and sharing meaning by constructing and interpreting text in oral, written, graphic, or electronic forms. This includes all facets of literacy in today's society, such as social literacy, critical literacy, and technological literacy. All aspects of e-learning and computer-related skills are part of literacy in the 21st Century. Thus, literacy development is embedded in the context of our everyday lives (Fehring, 2010). Being literate and being able to read are crucial to promote independent citizenship (Reardon, 2010) and this is especially so, given the highly influential waves of globalization and technology that Samoa is facing today. As a result, the government is constantly seeking ways to improve access to quality education and ensure students gain knowledge and skills of the 21st Century.

Honesty—Samoan core value

The analysis reflects one of the core values of Samoan culture called *fa'amaoni* [integrity, honesty]. This includes transparency, honesty and ethical conduct in each individual, actions as well as decisions. Taleni (2023) explained that "Samoans ... [live by] ... their cultural values [which] guide [them] and help [them] to be honest and do the right thing [and] at the same time

perform cultural practice in the right way—act with humility, not rely on your own knowledge, but consider knowledge from others” (p. 152). These notions came out strongly in the study when the research participants described their feelings while working on some of the assignments.

“E magaia gai fesoasoagi ia, ae ka ke lagoga ... le lē fekau, lē fa’amaogi o galuega ia e fa’akigo mai e gei auala [great help, but I can feel ... its not right, dishonest work produced from these methods] ... I wish we were allowed to use them in some way, because they are very helpful ...” S3.

“Of course ... honesty is part of our fa’aSamoa [Samoan way of life] ... but I am sure all students use ChatGPT, GenAI, Internet ... maybe teachers are using it too ... its very tempting to use it, because we are encouraged to use technology in our studies ... so these are also part of technology ... we use technology for typing our assignments in many different styles and formats, create videos etc ... so we should use them too ... so to me, I am honest because I am saying that I used ChatGPT with some modifications to the content” S4.

“part of me says it’s not right to use GenAI, ChatGPT, but my major concern is to pass this course ... these tools are helping me through” S6.

“... I use it, but every now and then I have feelings of guilt for using ChatGPT ... everyone I submit an assignment, I get so nervous in case I get caught ... and I might end up failing the course ...” S7.

It is obvious from the analysis that GenAI systems pose new challenges in academic dishonesty. Here, around 50% of the research participants think that the biggest threat is dishonesty. Despite being aware of Samoan cultural values, the temptation of using GenAI systems to cheat and submit content in assignments and projects that they did not create themselves continue to rise. Clearly, the tool is accessible, and it can easily be used by students for academic misconduct; this could include using the tool to generate reports, find answers to activities and assignments, and write a critical review. If the students rely too much on GenAI tools, they will not practice what they are supposed to and will not develop the skills they require. The result will basically encourage plagiarism and cheating, overreliance, dishonesty, and its tendency to provide misleading or inaccurate information (Dwivedi *et al.*, 2023).

Students’ voices

This theme highlight research participants’ perceptions and opinions on the use of GenAI in science education as well as other courses at university level. How students perceive and use GenAI tools can potentially depend on many factors. These include their background knowledge, familiarity with the tools, willingness to engage, potential benefits and challenges, effective integration and the learning goals and policies of the courses they are taking.

The discussions of the three themes indicate that where students are found struggling with assignments, GenAI can act as a virtual tutor, providing personalised learning support and answering their questions immediately. Moreover, GenAI can provide learning resources tailored to students’ specific needs. For example, ChatGPT was often used to accommodate the difficulties in writing assignments using a second language.

In terms of research, it appears that GenAI has the ability to acquire, compile, and consolidate information. For example, S4 stated that GenAI helped in *“facilitating literature searching,”*

“summarise readings,” and “even generate hypotheses based on data analysis”. With a vast amount of digital data and knowledge, GenAI can help researchers always stay up to date with the latest research trends. At the same time, the processing of information becomes a lot faster and very reliable. In addition, GenAI contributes to data collection and analysis. S8 explained that “*It saves resources in data collection and initial analysis. We should ride on the initial insights to build our own insights*”. Since GenAI technologies are capable of rapidly and effectively processing large amounts of data especially during research projects, students can directly work on the basis of the preliminary analysis results.

It is evident that the research participants are generally familiar with GenAI technologies, and their level of familiarity is influenced by factors such as knowledge about GenAI and frequency of use. This suggests that exposure to these technologies and hands-on experience may help in enhancing students’ understanding and acceptance of GenAI. Most of the research participants showed a good understanding of the capabilities and limitations of GenAI technologies, as well as a positive attitude towards using these technologies in their learning, completing assessment tasks and research. However, there were also some challenges and uncertain policies associated with GenAI, as well as its potential impact on personal and cultural observations.

With the positive and negative implications of GenAI, the research participants stated some very strong opinions, as summarised in table 3 below.

Table 3: Research participants opinions about GenAI

Summaries of opinions	Research participants
Allow the use of GenAI by university students	ALL
Proper explanations to guide GenAI usage-regulation, policy	ALL
Proper training on use of GenAI	S1, S3, S5, S8
University teachers to utilize these free resources	S3, S4, S5
Use of GenAI considered plagiarism?	S1, S2, S4, S7, S8
Isn’t GenAI part of technology in education?	S2, S5, S6
If other big countries use GenAI, why are Samoans not allowed	ALL

The summary (Table 3) can further be described as a proposal by the research participants to the university and lecturers about using GenAI in their studies. These opinions came to existence because the research participants realised that one of the key uses of GenAI in higher education is for enhancing their learning experience through its ability to respond to user prompts to generate highly original output. It can provide writing assistance to students, especially non-native English-speaking students (Chan & Lee, 2023), by enabling them to brainstorm ideas and get feedback on their writing through applications such as ChatGPT.

Although the university has established academic policies and procedures, it is also important to consider the voice of the students in this study. There are many benefits to promoting student voice in the classroom. Focusing on student voice promotes engagement at every level, builds trust with lecturers, addresses equity in the classroom and the wider community, and ultimately contributes to student success. It also helps leaders gain support for beneficial programs and initiatives while improving overall student mental health. In addition, by taking students’ perceptions into account, educators and policymakers can better tailor GenAI technologies to address students’ needs and concerns while promoting effective learning outcomes. In doing so, the students would be able to continue to utilize GenAI tools to elevate excellence, quality and autonomous learning but ensure integrity is maintained while studying science education.

CONCLUSIONS

The aim of this study was to explore students' experiences of GenAI and its contribution to elevating quality and excellence while maintaining integrity in science education in Samoa. The study supports the literature about the roles of GenAI in generating educational content, personalised learning experiences, support assessments tasks, academic writing as well as second language developments. Furthermore, the study identified that GenAI tools can contribute to (i) improve quality of submissions, (ii) address adult learners' literacy needs, and (iii) recognize and practice honesty (Samoan core value). Base on the current situation at the National University of Samoa—GenAI tools are not permitted—the study acknowledged the (iv) students' voice for educators and policymakers to consider GenAI as one of the approaches to raise the quality of education as well as increasing number of university graduates. The literature review confirms that GenAI has the potential to transform and improve excellence in education, however, its benefits will only be fully realised if it is implemented responsibly and equitably. By working towards integrating GenAI into our classroom practices, we can help students engage more deeply with the material. This means creating assignments that encourage critical thinking with GenAI, reflecting on the learning process, and understanding the material. Guiding students to use GenAI responsibly ensures that it complements their learning rather than detracts from it. With this approach, we can turn potential challenges into powerful teaching tools, preparing students for educational experiences and their professional futures.

Lastly, higher education institutions should consider rethinking their policy, curricula and teaching approaches to better prepare students for a future where GenAI technologies are prevalent. This will also support one of the pillars of the Pacific Regional Education Framework (PacREF) which urges for the integration of technology in education in Pacific schools. GenAI may involve fostering interdisciplinary learning, emphasizing critical thinking and creativity, and cultivating digital literacy and AI ethics education. Therefore, this study confirms that GenAI has the potential to elevate excellence in science education in Samoa. Maintaining integrity and ethical use of GenAI can be achieved through the use of clear guidelines and procedures within the university.

In conclusion, this study sheds light on the diverse perspectives of university students towards GenAI technologies and underscores the need for a balanced approach to integrating these technologies into higher education. By addressing students' concerns and maximizing the potential benefits, higher education institutions can harness the power of these technological tools to enhance teaching and learning outcomes. At the same time, the university is preparing students for the future workforce in this fast-growing globalized community—Samoa—as well as the GenAI- era that we are facing today.

This study confirms that the students will continue to use GenAI even if their professors or institutions ban the technology

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