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The Effectiveness of Using GenAI Tools for Developing Digital Learning Resources: Evidence from Educators' Perceptions

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Abstract. This study aimed to examine the integration of Generative Artificial Intelligence (GenAI) tools in education, focusing on educators' perceptions according to the Technology Acceptance Model. The study followed the quasi-experimental design using a one-group design to determine educators' perceptions of usefulness, ease of use, and attitude toward designing and producing digital learning. Data were collected from 10 participants enrolled in a graduate course via a questionnaire and an in-depth interview with 8 educators to share their experiences with GenAI-based tools. Findings revealed that educators view GenAI tools positively, particularly for their efficiency, ease of use, and ability to enhance content creation and visual resources. Practical, hands-on exposure through targeted training significantly enhanced educators' perceptions of technology use and their attitudes, highlighting the value of experiential learning in promoting technology acceptance. Although GenAI tools help simplify workload management and design/produce digital materials, there were challenges related to linguistic and cultural adaptability, particularly for non-English languages like Arabic. This study highlighted that GenAI is complementary to education, enhancing traditional methods rather than replacing them. Also, it highlights the need for educators' strategic training, addressing language barriers in GenAI tools, and adopting blended approaches. Further studies should explore the long-term impacts of GenAI tools on teaching practices and student outcomes, focusing on their efficacy in diverse educational contexts and subject areas.

Keywords: educators; generative artificial intelligence; design; digital learning resources; perception

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1. Introduction

Artificial intelligence (AI) has become a pervasive technology in daily life. It is increasingly embedded in everyday life with new products, services, and systems (Stoimenova & Price, 2020). AI has shown great educational potential to revolutionise teaching and learning at all levels, from elementary to higher education. AI has become a valuable resource for personalising education, automating administrative tasks, providing intelligent tutoring, and providing predictive analytics (Grájeda et al., 2023). According to research, AI-based tools significantly improve students' learning by fostering their capacity for creative problem-solving, communication, and thinking (Darwin et al., 2023).

Additionally, AI technologies are considered adequate in educational settings since they serve a variety of learning demands and encourage engagement, self-learning, and fun. Further, incorporating AI into education provides personalised learning experiences that effectively address each student's diverse needs (Chen et al., 2020). AI advancements have created both new opportunities and difficulties for teaching and learning in K–12 and higher education, which could drastically change these institutions' internal structure and governance (Murphy, 2019; Singh & Hiran, 2022).

In the Kingdom of Saudi Arabia, there have been continued efforts toward developing teaching methods and curricula using new technology, including AI and its applications. In KSA, on 30 August 2019, the Saudi Data and Artificial Intelligence Authority (SDAIA) was established as a government agency concerned with big data and AI. It launched several training programs to train teachers on AI and machine learning principles to keep them updated with technological advances (SDAIA, 2024). Also, national guidelines were developed for using Generative Artificial Intelligence (GenAI) and its applications in education. Artificial intelligence (AI) technology, known as GenAI, can create a wide range of content, including text, images, music, video, and synthetic data (SDAIA, 2023). In this sense, it is essential to emphasise that this is not just a matter of technological knowledge. Still, in education, knowledge should also be on a pedagogical and instructional level (Mosquera-Gende, 2023).

Considering teaching practices, although most teachers report enjoying their jobs, they did not report enjoying grading papers, creating lesson plans and resources, or filling out endless paperwork (Bryant et al., 2020). Further, teachers are responsible for designing learning resources that meet different students' needs (Sofia, 2023). This required teachers to share students with various learning materials to maximise their learning and provide meaningful experiences. In education contexts, some educators have already started testing the efficiency of GAI; for example, ChatGPT has the potential to enhance teaching practices and save teachers time by developing customised instructional materials, preparing assessment tasks, and offering immediate feedback in real-time on student performance (Seo et al., 2021; Terwiesch, 2023). Consequently, using ChatGPT saved teachers time for other essential activities like spending more time with students (Terwiesch, 2023). Therefore, for teachers, effectively integrating AI into the classroom and increasing their level of AI literacy is now an essential goal for

teachers' long-term professional growth (Zhao et al., 2022). Lastly, effectively using AI tools will empower teachers to develop innovative instructional methods (Sofia, 2023).

Given everything discussed above, teacher education is essential for equipping teachers with the knowledge and skills to integrate technology into the classroom effectively. It encompasses the techniques, plans, and guidelines that prepare educators with professional expertise, instructional skills, and assessment methods needed to carry out their teaching responsibilities and contribute to societal development (Salas-Pilco et al., 2022). Most teachers now acknowledge the significance of technology in teaching and learning. However, technology integration can be impacted by several factors, including the availability of resources and the teachers' attitudes, knowledge, and skills (Farjon et al., 2019; Sergeeva et al., 2024). Similarly, Cooper et al. (2019) reported that the potential of technology to improve teaching and learning experiences is linked to pre-service teachers' positive perceptions of evolving technologies. In this study, "in-service teachers," "pre-service teachers," and "teachers" are all referred to as "educators".

Several authors (e.g., Tlili et al., 2023; Zhao et al., 2022) have written about the implications that AI, specifically ChatGPT, might have on education in different countries. Also, previous efforts research focused on the effects of AI on students' learning (Mosquera-Gende, 2023; Yilmaz & Yilmaz, 2023), teaching of AI literacy in an education setting (Chiu & Chai, 2020; Zhao et al., 2022); or generating lesson planning (Van den Berg & du Plessis, 2023). Further, a recent review of AI in education has highlighted the lack of studies on teachers' perspectives (Zhang & Aslan, 2021). However, no research has studied teachers' perceptions of GenAI as a support tool for designing/producing digital learning resources, specifically in the Saudi context. For this reason, this research aims to investigate how teachers perceived GenAI's usefulness and ease of use and their attitudes toward using GenAI-based technology as a support tool to design and produce digital learning resources. This study attempted to understand the teachers' choice of action in designing learning resource materials and the personal reasoning behind the teachers' usage of GenAI. For this purpose, the TAM model (Davis, 1989) was adapted to investigate teachers' perceptions of usefulness, ease of use, and attitude toward using GenAI-based technology to design and produce digital learning resources. The TAM is a theoretical model that helps understand how users accept and utilise technology (Davis, 1989; Davis et al., 1989). This research refers to the TAM model, which assumes three aspects of the user's beliefs: perceived usefulness, perceived ease of use, and attitude toward usage (Figure 1). In light of the previous review, the research questions for this study were as follows:

> RQ 1: What are the educators' primary uses of GenAI tools?
> RQ 2: How do educators perceive the usefulness of GenAI tools in designing and producing digital learning resources before and after experiencing their application?
> RQ 3: How do educators perceive the ease of using GenAI tools in designing and producing digital learning resources before and after experiencing their application?

RQ 4: Do educators' attitudes toward using GenAI tools in designing digital learning resources differ before and after experiencing their application?

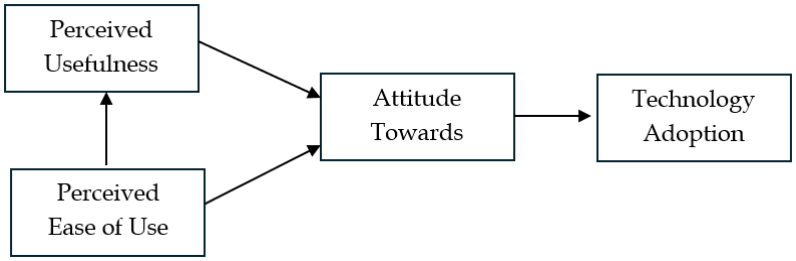

Figure 1: Technology acceptance model (Davis, 1989; Davis et al., 1989)

2. Literature Review

2.1 Generative AI Tools Use in Education

AI has emerged as a key driver of innovation and change in education, just as innovative technology fosters the growth of other industries. The integration of AI in education holds promise in revolutionising the teaching, assessment, and analytics landscape, supporting teachers' roles through augmentation and automation, and personalising learning content and experience (Milberg, 2024). Artificial intelligence (AI) refers to digital devices and systems that simulate human intelligence to help people carry out a variety of jobs and resolve complex problems (Wang, 2019). Further, GenAI refers to AI applications aimed at generating new content such as text, images, video, music, artwork, and synthetic data depending on a variety of machine learning algorithms (Chan & Hu, 2023). These applications are not explicitly designed to generate particular content, even when produced in response to user input. Instead, these systems create new content by learning and analysing statistical structures and rules from a large dataset (Tanwar et al., 2023). In the field of education, GenAI presents exciting possibilities for lesson design, individualised instruction, assessment and feedback, and resolving student challenges (Rahman & Watanobe, 2023). This calls for universities and schools to embrace technological advancements in the teaching and learning process to provide creative and meaningful ways to achieve learning outcomes (Tlili et al., 2023).

AI can be a powerful technology for enhancing teaching and learning. Using Generative AI for instructional purposes has significantly improved instructors' work effectiveness, efficiency, and quality (Chen et al., 2020). According to Namatherdhala et al. (2022), three primary ways AI integration is demonstrated in education are instructional design, teaching process, and administrative aspects. Different researchers proved that AI is a valuable technology for educators, particularly those needing support in instructional design (Arvin et al., 2023; Baker & Smith, 2019; Zhao et al., 2022). It provides guidance and resources for planning and executing activities while also assisting in implementing practices and tasks (Arvin et al., 2023; Zhao et al., 2022). Also, AI tools can enhance education in several ways, including simplifying the creation of teaching resources by teachers and offering novel approaches to student learning and collaboration (Carvalho et al., 2022). Therefore, educators and instructional

designers should utilise the potential of advanced digital technology to transform education (Namatherdhala et al., 2022).

Moreover, designing learning materials is crucial. To provide the students with meaningful experiences, designed learning materials should be relevant to students' needs, interests, and goals (Sofia, 2023). For instance, teachers have found AI tools like ChatGPT and Twee to help design lesson plans, support learning materials such as worksheets, and improve their teaching by empowering them to innovate teaching methods (Van den Berg & du Plessis, 2023). Further, AI tools support teachers in creating a variety of assignments and provide plenty of opportunities for students to reflect and provide feedback (Sofia, 2023). Also, AI tools helped reduce teacher workload and improved the quality of their work (Chan & Hu, 2023). A study conducted by McKinsey in 2017 showed that although teachers dedicate an average of fifty hours a week, they only spend less than half of that time interacting with students. Teachers can use AI tools to devote more time to instruction and individualised student interactions. Additionally, they can use teacher-facing technologies such as ChatGPT to reduce their workload and improve the efficiency of various tasks, including feedback, assessment, and plagiarism detection (Baker & Smith, 2019; Van den Berg & du Plessis, 2023). Another example is that AI can assist teachers by automating administrative tasks, allowing them to concentrate more on teaching and personal interactions with students, thus enhancing human-led teaching instead of replacing it (Milberg, 2024).

Furthermore, the application of AI in education has also affected how students learn. AI can improve student learning in several ways, including improving students' skills and fostering a collaborative environment in higher education (Kuleto et al., 2021). Different studies showed that the use of AI tools increases students' performance. For example, a study by Utami et al. (2023) revealed that AI tools positively influenced Indonesian students' writing skills. AI-based learning tools assisted students during the written academic research planning stage, such as identifying and developing the topics and creating the paper draft. Also, students thought that AI-based learning tools are flexible in accessibility even though they cannot cover all the necessities students require in the writing process. However, the researchers pointed out that AI tools have not positively impacted the quality of students' academic papers across all measures (Utami et al., 2023). This implies that AI should be utilised as a supplementary tool rather than a substitute for critical thinking, creativity, and in-depth writing skills requiring human intervention. It also highlighted the necessity of integrating AI into education in a balanced way that allows students to take advantage of its advantages while simultaneously developing their academic skills.

Further, other studies revealed that GenAI tools, such as ChatGPT, significantly affect students' computational thinking skills and programming self-efficacy. However, the use of ChatGPT did not substantially increase student motivation (Yilmaz & Yilmaz, 2023). This could be due to several reasons, such as students missing human interaction and/or the passive learning experience, which may not be as motivating as interactive or hands-on learning methods. This suggests

that while AI tools help develop skills, they should be integrated with engaging teaching strategies, peer collaboration, and real-world problem-solving to enhance student motivation. The researcher concluded that utilising AI tools such as ChatGPT in programming education improves students' learning processes and outcomes (Yilmaz & Yilmaz, 2023). Further, students can participate in a dialogue or conversation-based task with the help of task-oriented chatbots to improve their skills and learning. Ruan et al. (2019) piloted the BookBuddy chatbot to transform reading materials into interactive, conversational tasks for learning English. According to the study, students' performance improved in learning basic English through interacting with the chatbot and completing short language learning exercises.

Furthermore, Neto and Fernandes (2019) created a chatbot to enhance the automation of collaborative learning tasks by assisting student groups in interacting and collaborating through networked discussions. The researcher concluded that the chatbot could help with group formation, cohesiveness, and the execution of group activities. Further, Chang et al. (2023) examined how educational chatbots can enhance students' self-regulation and self-evaluation during learning. The researchers recommended that chatbot designers consider pedagogical concepts such as goal setting, planning, self-assessment, and personalisation to ensure the chatbot enhances and supports student learning. They also emphasised how chatbots may provide students tailored feedback on how well they understand the course material and promote self-assessment by encouraging them to reflect on their learning experiences (Chang et al., 2023).

2.2 Perceptions of AI in Education

Teachers' perceptions of AI as a supportive educational tool vary significantly across different contexts. Understanding these perceptions is crucial for designing interventions that align with teachers' attitudes and address their concerns, facilitating smoother AI technology adoption (Chiu & Chai, 2020). Studies exploring teachers' views (Arvin et al., 2023; Chiu & Chai, 2020) illustrated the diverse attitudes toward AI in education. In the study by Arvin et al., teachers expressed a growing interest in using AI to support teaching and learning. The researcher found that teachers view AI as a valuable tool for personalised learning, student engagement, and automated grading. However, successful AI integration requires ongoing teacher training to enhance their understanding of its applications and ethical implications. The study also highlighted the need to address concerns about privacy and fairness to ensure responsible AI use in education.

Moreover, Chiu and Chai (2020) examined teachers' perspectives on developing and improving AI curricula in K-12 education. The results revealed that while teachers were skilled in ICT, they faced anxiety and lacked confidence in teaching AI. The study emphasised the need to address these concerns to support educational innovation. The researchers proposed a development cycle for AI curricula that prioritises teachers' needs and fosters professional growth via interconnected school and leadership networks. Furthermore, teacher AI training programs should be reconsidered and offered at all levels as a continuous learning

process, utilising the various aspects of competence from technical domains to AI innovations to produce qualified educators who successfully and appropriately integrate AI in their classrooms (Zhao et al., 2022). Finally, despite the various advantages of using AI to support teaching, teachers' perceptions and usages of AI are mainly challenged by a lack of teaching experiences, insufficient background knowledge, challenges in course development, limited instructional tools and resources, and a shortage of class hours (Song et al., 2023).

In the Saudi context, a study by Alammari (2024) revealed a significant correlation between educators' use of Generative AI in their instruction and their knowledge of it. The researcher reported a noticeable readiness for educators' adoption. Moreover, the study's results emphasised the perceived benefit and ease of use related to the integration of GAI, thus reinforcing that educators are motivated and desire to integrate GAI tools like ChatGPT into their teaching. However, drawbacks were also identified, including potential overreliance on technology, plagiarism-related issues, and the necessity for a balanced approach. Similarly, Aljohani (2021) investigated teachers' and students' perceptions of using AI to improve English language learning. The results showed that teachers and students had a positive attitude toward using artificial intelligence in learning English.

Moreover, Alnasib (2023) examined the factors influencing the readiness of Saudi faculty members to integrate artificial intelligence into their teaching practices. The findings showed that the faculty demonstrated average readiness to incorporate AI into their teaching. Significant statistical correlations were identified between the faculty members' readiness to use AI in their teaching and several factors, including their perceived benefits of AI in higher education, attitudes toward AI, behavioural intentions to utilise AI, and the supportive conditions necessary for using AI effectively. Alnasib (2023) concluded that teachers' perceptions are helpful tools that influence their behaviour. Teachers with a positive attitude toward technology also perform better and are more motivated. This is relevant to the technology acceptance model, a theoretical model that helps understand how users accept and employ technology (Davis, 1989). Three assumptions concerning user beliefs reinforce the TAM model: perceived usefulness, perceived ease of use, and attitude toward usage. That is, confidence in utilising technology to enhance their performance and capabilities is reflected in their perceived usefulness. The TAM model helped assess how well users integrate technology into their daily lives. A study by Utami et al. (2023) found that most Indonesian students positively perceive the usefulness and ease of use of AI technology in their writing classes. However, a significant challenge in incorporating AI into education was ensuring equitable access to these tools and the necessary skills and training data for their practical use. For instance, students with access to AI tools are likely to benefit more than those without, which could exacerbate the digital divide (Zhang et al., 2025) and result in disparities in academic achievement (Chan & Hu, 2023).

3. Methodology

Table 1: Frequencies and percentages of participants' characteristics (N=10)

Variables	Categories	Frequency	Percentage
Teaching Experience	No experience	1	10%
	Less than 5 years	3	30%
	5-10 years	5	50%
	More than 10 years	1	10%
	Total	10	100%
Previous experience with GenAI tools	Yes	8	80%
	No	2	20%
	Total	10	100%
Primary uses of GenAI tools	Asking general knowledge questions	7	16.67%
	Scientific research	3	7.14%
	Lesson planning	3	7.14%
	Preparing training content	3	7.14%
	Producing learning resources	5	11.90%
	Writing articles	2	4.76%
	Solving assignments and tasks	3	7.14%
	Ask specialized questions in the field of expertise	4	9.52%
	Translation	2	4.76%
	Proofreading	1	2.38%
GenAI tools used previously	Chat GPT	7	70%
	Gamma	2	20%
	Fliki	1	10%
	Leonardo. Ai	1	10%
	Copilot	2	20%
	Poe	3	30%

3.1 Participants

The participants were selected purposefully from educators enrolled in the course "Design and Production of Digital Learning Resources," a three-credit semester course for students in their first year of master's degree in the Instructional Technology master's program in the College of Education, Imam Abdulrahman bin Faisal University, Saudi Arabia. The cohort consisted of only 12 students; due to the limited cohort size, the researcher purposefully selected the entire group to ensure full representation of the available participants. Studying the whole population in small, specialised educational settings, such as postgraduate instructional technology programs, ensures comprehensive insights. While the sample size limits broad generalizability, this study provides an in-depth exploratory analysis, aligning with small-scale educational research methodologies (Creswell & Creswell, 2018). Ten participants agreed to participate in the research and complete the survey. Among the participants, 50% had teaching experience, 30% had less than five years, 10% had no experience, and 10% had more than 10 years of experience (Table 1).

3.2 Study Design and Procedure

A quasi-experimental design was employed in the research to determine educators' perceptions of usefulness, ease of use, and attitude toward designing and producing digital learning resources (videos, presentations, activities, etc.). The quasi-experimental design helps to answer research questions and explore the impact of interventions (Creswell & Creswell, 2018). The researcher assessed educators' perceptions of AI, specifically regarding using two GenAI tools. A one-group pre-post-test design was used. The pre-post-test of the study instruments was applied to the experimental research group see Table 2.

The course introduced the concept of digital learning resources and how educators could design and produce different digital learning resources, such as presentations, digital learning objects, online exams, infographics, digital stories, etc. First, using a TAM-based questionnaire, the researcher assessed the educator's perceptions (usefulness, easiness, and attitude). Then, two GenAI tools were introduced to educators so they could learn how to design and create digital learning resources. All students were permitted free access to the selected GenAI tools. The first program was Fliki, a tool for creating videos using AI. It allows users to quickly create video, audio, and images with prior technical expertise. Further, it allows the creation of videos in all languages and enables editing the video after its creation, adding effects and pictures to make it suitable for the target audience (Fliki, n.d.). The second program was Gamma, a tool that uses AI to help users create presentations, documents, and web pages quickly and efficiently. It allows users to create content through simple instructions for AI, as the system organises and designs the texts appealingly (Gamma, n.d.). Users can also customise and modify the generated content to suit their needs. The educators were asked to create digital learning resources using those GenAI tools as a part of their course tasks. Then, educators' perceptions were assessed using a questionnaire of three parts: perceptions of usefulness, ease of use, and attitude toward using GenAI-based technology. Finally, a follow-up interview was conducted to learn more about educators' perceptions regarding the process and quality of the digital learning resources.

Table 2: The experimental design of the study

Week	Design
Week 11	The instructor delivered practical lectures on using technology tools to design digital learning resources (Hands-on activity).
Week 11-12	Educators designed and produced digital learning resources using traditional tools (e.g., PowerPoint- i-movie).
Week 12	The instructor created a guidebook on GenAI tools (Fliki, Gamma) and provided instructions for educators.
Week 13	**Pret-test:** TAM scale of educator's perceived usefulness, ease of use, and attitude toward GenAI use.
Week 13	The instructor delivered a practical lecture on using GenAI-based tools (Hands-on activity).
Week 13-14	Educators designed and produced digital learning resources using GenAI tools (Fliki, Gamma).
Week 15	**Post-test:** TAM scale of educator's perceived usefulness, ease of use, and attitude toward GenAI use.
Week 15	In-depth Interview

3.3. Instruments and Data Collection

The data for the study was collected using a questionnaire, which was followed by in-depth interviews. The questionnaire consisted of sixteen items adapted from Utami et al. (2023), which was designed to assess students' perceptions of usefulness, ease of use, and attitude toward using AI as a writing learning tool. Utami et al. (2023) developed the questionnaire based on the theoretical construction of TAM (Davis, 1989; Davis et al., 1989). Three experts in education and technology validated the questionnaire in Arabic and English. To ensure content validity, they were asked to evaluate the items' appropriateness, relevance to the assessed theme, and clarity of wording. Out of 16 items, 12 were used based on the expert's views, and minor changes were made.

The questionnaire consisted of two parts. The first part was to collect participants' demographic information. In the second part, participants were asked about their perceptions of usefulness (6 items), ease of use (5 items), and attitudes toward usage of GenAI-based technology (5 items). The responses for the second part were measured using a five-point Likert scale under the options of answers as follows: 5 for strongly agree (SA), 4 for agree (A), 3 for neutral (N), 2 for disagree (D), and 1 for strongly disagree (SD) (Appendix 1). Moreover, the internal reliability of the questionnaire and each subscale was determined by using Cronbach's Alpha: Overall ($\alpha = 0.70$), usefulness ($\alpha = 0.71$), ease of use ($\alpha = 0.64$), and attitudes ($\alpha = 0.75$).

Furthermore, an in-depth interview was conducted to follow up on the questionnaire. The interview consisted of 4 questions. Eight participants agreed to participate in the interview, which consisted of four questions, and share their experiences with GenAI-based tools in designing digital learning resources. The interview questions were as follows:

> Question 1. What features of GenAI-based design tools were identified after designing the video/presentation?
>
> Question 2. What challenges were faced while using GenAI-based design tools?
>
> Question 3. How do the design steps using traditional tools (such as PowerPoint or iMovie) compare to those using GenAI-based design tools regarding procedures, ease of use, flexibility, steps to reach the final product, and time spent?

Question 4. How does the quality of the final product created with GenAI-based design tools compare to that produced using traditional tools?

3.4 Data Analysis

The quantitative data from the questionnaire were calculated using the mean, standard deviation, and t-value of the scores of the educators in the experimental group for the pre- and post-test in the TAM scale of educators' beliefs: perceived usefulness, perceived ease of use, and attitude toward GenAI usage. The qualitative data was derived from interviews which explained the process of using GenAI tools. The researcher recorded the responses to score the answers, using a numerical code for each participant's identification. The naming of the

subjects was coded with numbers. During the process, the researcher removed duplicate and unnecessary data. The results of the interview are reported below.

4. Results

The study achieved a response rate of 83.3%, with 10 out of the 12 master's students completing the questionnaire. The first section of the survey gathered demographic information, including participants' teaching experience, previous experience with GenAI tools, primary uses of GenAI tools, and GenAI tools used previously. This information helped to understand the backgrounds of all the participants. Table 1 provides the participants' characteristics.

Research question 1: What are the educators' primary uses of GenAI tools?

The descriptive analysis of the first question revealed a variety of applications by participants. The most common use was asking general knowledge questions (16.67%). Other frequent uses included producing learning resources (11.90%) and asking specialised questions in the field of expertise (9.52%). Several participants used GenAI tools for lesson planning, preparing training content, solving assignments and tasks, and scientific research (7.14%). Less common uses included writing articles and translation (4.76%) and proofreading (2.38%). Notably, all respondents indicated prior use of GenAI tools.

Research question 2: How do educators perceive the usefulness of GenAI tools in designing and producing digital learning resources before and after experiencing their application?

Research question 3: How do educators perceive the ease of using GenAI tools in designing and producing digital learning resources before and after experiencing their application?

Research question 4: Do educators' attitudes toward using GenAI tools in designing digital learning resources differ before and after experiencing their application?

Quantitative and qualitative data were analysed to answer questions 2, 3, and 4. A paired t-test analysis was conducted to determine whether there were significant differences in usefulness, ease of use, and attitudes toward GenAI tools before and after experiencing their application. The results showed an increase in the perceived usefulness of GenAI after delivering the practical lecture (Mean increase from 24.40 to 27.10). However, the change was not statistically significant ($t = -1.570$, $p = 0.075$). This suggests that, while participants found GenAI slightly more helpful after the lecture, the increase was not enough to indicate that the practical lecture directly impacted this perception (Table 3). Also, this could be explained by the answer to the first research question, where teachers had varied uses of GenAI tools.

Table 3: The Mean scores of the pre-test and post-test in the experimental group

Test	Pretest		Post-test		t	Sig	Cohen's d	Effect size
	Mean	SD	Mean	SD				
Perceived Usefulness	24.40	4.59	27.10	4.25	1.570	.075	-	-
Ease of use	21.40	3.59	23.30	1.33	1.980	.040	0.5	Medium
Attitudes	21.00	3.74	22.90	2.72	1.956	.041	0.6	Medium

Moreover, the t-test revealed a significant increase in perceived ease of use of GenAI ($p < 0.05$), indicating that participants felt more comfortable and found GenAI tools more straightforward to use after the practical lecture because they were trained and practised how to use it in their lessons (Table 3). This suggests that the hands-on experience provided by the lecture played an essential role in improving participants' familiarity with the tools, thereby making them feel more competent in using this technology.

The results also showed a significant positive change in attitudes toward GenAI ($p < 0.05$), indicating that participants developed more favourable attitudes toward using GenAI after the lecture (Table 3). This change shows that using GenAI tools in a practical context likely improved confidence and contributed to a more positive view of its use.

Interview questions: The interviews' results provided an in-depth understanding of educators' use of GenAI tools, the challenges they face, and their perceived competency levels. The insights revealed a balanced view of GenAI's potential and limitations in educational design, with a strong appreciation for its speed and efficiency and a need for customisation and cultural adaptability improvement. Below are the summarised findings, organised by interview questions.

Question 1. What features of GenAI-based design tools were identified after designing the video/presentation?

The analysis of educators' responses reveals three prominent themes in their experiences with GenAI-based design tools: ease of content creation, visual quality, editing options, and saving time and effort (Table 4).

Table 4: Emerging themes of features of GenAI-based design tools

Emerging themes		Educators' responses
1	**Ease of Content Creation**	**Educator 1**: "Ease of content presentation and sentence paraphrasing – Fliki make quickly and impressively transformed a blog into a video. These tools made it easier to brainstorm and structure ideas quickly". **Educator 2**: "Using Gamma makes it easy to generate ideas and sounds. Also, writing content suitable for all ages without programming". **Educator 3**: "Gamma helped me to arrange ideas, link topics, and produce new topics based on old ones. When adding a new word, it generates new information and ideas.

		Educator 7: These tools are easy to use and have good images that can be edited.
2	**Visual Quality and Editing Options**	**Educator 1**: "The images are very attractive and high quality". **Educator 4**:" GenAI tools offer multiple designs in various templates, and I can export and edit content across different platforms". **Educator 5:** "GenAI tools have very high-quality images and good characters. GenAI easiness the use of infographics and visually appealing designs. They are excellent at organizing and improving content". **Educator 7:** "GenAI tools allow me to reorder and rephrase titles and ideas, giving me control over design colours, size, and background colours."
3	**Saving Time and Effort**	**Educator 2:** "Using Gamma is easy, fast, and useful for teachers". **Educator 5:** "GenAI tools saved time and effort for teachers". **Educator 6**: "These tools save time and effort to create content by starting with specific content and help us to improve it".

Overall, the results revealed that GenAI tools do more than automate—they also empower users to engage creatively with their content. Another advantage was the considerable time and effort savings. This has a particularly significant influence on educational environments, where time is frequently scarce.

Question 2. What challenges were faced while using GenAI-based design tools?

The findings reveal several notable challenges educators encountered while using GenAI-based design tools, which fall under three key themes: incompatibility with cultural and language preferences, formatting issues, and image appropriateness (Table 5).

Table 5: Emerging themes for challenges while using GenAI-based design tools

Emerging Themes		Educators' responses
1	**Incompatibility with Cultural and Language Preferences**	**Educator 1**: "The Arabic language needs review because it is inaccurate in these tools. **Educator 5**: "Gamma did not support Arabic when a slide was retranslated". **Educator 6**: "I noticed that the sentence structure is incorrect. It is not suitable for the target audience, especially in Arabic, and the formatting of text directions is not good". **Educator 8**: "It is not suitable for Arabic culture, the Arabic language, or the pronunciation of words. I noticed that when Gamma and Fliki generated the presentation and video, the content needed revision and could not be fully relied upon.

2	**Formatting Issues**	**Educator 1: "**When exporting the generated presentation in Gamma, the layout changed and cost me quite a time to fix it". **Educator 2**:" When downloading the presentation from Gamma to PowerPoint, the background colours and text were inverted, and the formatting changed according to the devices. Sending the link to the students is better than downloading it as a PowerPoint". **Educator 6**: "The formatting of text directions was not good and accurate."
3	**Image Appropriateness**	**Educator 3**: The images are not appropriate for the target audience. They are real images—gamma—and not cartoon images. **Educator 7**: "Sometimes images are inappropriate". **Educator 8**: "Images are not suitable for the age group".

Educators identified several key challenges when using GenAI tools like Gamma and Fliki. A primary concern was the limited support for Arabic language and cultural context, including inaccurate sentence structures, poor pronunciation, and culturally inappropriate content. This lack of localisation reduces the tools' reliability and demands additional revision time from educators. Formatting issues also disrupted workflow, mainly when exporting content to PowerPoint, where layout shifts and colour changes were familiar. These technical inconsistencies undermine the efficiency that GenAI tools are intended to offer.
Additionally, educators raised concerns about the inappropriateness of generated images for younger learners. The frequent use of real-life images, rather than age-appropriate visuals such as cartoons or illustrations, indicated a lack of contextual awareness in image generation. These challenges highlight the need for more culturally adaptive, technically stable, and audience-sensitive GenAI design tools in educational contexts.

Question 3. How do you compare the design steps using traditional tools (for example, PowerPoint- i-movie) to GenAI-based design tools regarding procedures, ease, flexibility, steps followed to reach the final product, and time spent?

Educators had mixed responses when comparing GenAI tools to traditional design tools. Regarding ease and speed, educators generally found GenAI tools quicker and simpler to use than conventional tools. For example, educator 8 emphasised the "reduced time needed to create presentations", while educators 5 and 6 appreciated the guided steps that GenAI tools offer, making the design experience more efficient and accessible. On the other hand, quality and customisation were concerns. Several educators noted that traditional tools allowed for greater flexibility and customisation. Educators 1 and 3 preferred the control over quality that traditional tools provide, particularly for design elements like colour and impactful images - something they found lacking in GenAI tools. Finally, some educators preferred combining both tools. Educator 2, for instance,

noted that "traditional tools produce higher-quality outputs, but GenAI tools are more practical for time constraints".

These results highlighted a significant contradiction between effectiveness and creative autonomy in educational design practices. Although GenAI technologies make design more accessible by easing procedures and reducing workload, they might not yet be able to match traditional tools' level of control or aesthetic accuracy. In their current form, this implies that GenAI tools are best suited for quick prototyping or time-constrained situations rather than producing high-end customised outputs.

Question 4. How does the quality of the final product created with GenAI-based design tools compare to that produced using traditional tools?

Educators reported varied perspectives on the quality of outputs produced by GenAI-based design tools compared to traditional design methods. Three key themes emerged: visual appeal, dependence on user skills, and audience appropriateness (Table 6).

Table 6: Emerging themes for the quality of the product from GenAI-based design tools vs traditional tools

Emerging Themes		Educators' responses
1	**Visual Appeal**	**Educator 1** reported that "the quality of GenAI-produced content is superior in terms of colours, animation, and infographics". However, all the educators noted the distinct appearance of GenAI-created content, which sometimes led to minor formatting inconsistencies. **Educator 5:** "The content generated by GenAI needs review, and its images are of higher quality. Traditional presentations offer more freedom in choosing templates, but GenAI applications are faster in content creation". **Educator 6**: "Traditional tools for designing presentations give more freedom in choosing templates, but GenAI tools create content faster". **Educator 7:** "The traditional method is better because the user creates the content from scratch and does not need to change the color or images, which are sometimes unrealistic (suitable for the age group and topic)". **Educator 8**: "The traditional approach has better quality because it is built from scratch, whereas GenAI is not of high quality".
2	**Dependence on User Skills**	**Educator 3** mentioned that "product quality largely depended on the user's experience level in which experienced users could produce higher quality with traditional tools, while beginners might benefit more from GenAI assistance." **Educator 7**: "If the teacher has the experience and good skills in using AI tools, it will help design the digital learning materials."

3	**Audience Appropriateness**	**Educator 4** mentioned that "while GenAI-based tools produce high-quality visuals, traditional tools allow more adaptability to tailor content for different age groups and target audiences". **Educator 7:** "Sometimes the content generated is unsuitable for the age group and topic".

The results revealed that while GenAI tools produced visually appealing content, they lacked the adaptability to tailor materials for specific age groups or cultural contexts. Traditional tools were seen as better suited for context-aware, learner-sensitive design, highlighting the need for improved customisation features in GenAI platforms.

5. Discussion

Educators play a vital role in the successful integration of GenAI tools. The efficient use of these tools in the classroom can be determined by their methodological and technical proficiency and their perceptions (Grájeda et al., 2023). Therefore, examining educators' perceptions of using GenAI tools is essential. This research showed that most educators positively perceive GenAI technology in designing and producing digital learning resources that meet diverse students' needs. This was clear from three indicators: usefulness, ease of use, and attitude. This is consistent with Alammari's (2024) research, which revealed that educators were encouraged and more likely to use GenAI in their teaching methods due to its perceived value and ease. Also, he concluded that exposure to AI technology promotes trust and integration into educational practices.

Furthermore, this study's findings revealed essential insights into the role of practical learning experiences in shaping educators' perceptions of GenAI tools. Specifically, giving them a chance to experience the application of GenAI tools significantly impacted their perceptions of using them. These results align with research by Arvin et al. (2023), who concluded that developing educators' knowledge of AI and its uses is crucial to creating a classroom atmosphere that promotes creativity, ethical reasoning, and critical thinking.

Moreover, educators perceived positive ease of use and usefulness in using GenAI, as reported in the interview. Educators asserted that GenAI tools can assist them in generating content quickly and managing their growing workload, as they save time and effort. The alignment of this study with previous research highlights a shared recognition of the critical role of GenAI in offering opportunities for designing digital learning materials (Sofia, 2023; Van den Berg & du Plessis, 2023). Also, AI systems can quickly generate course materials and syllabi to assist teachers in creating individualised content (Carvalho et al., 2022). It emphasises the need for a concerted effort to enhance teacher competencies in adopting AI tools (Arvin et al., 2023). Further, AI tools allow teachers to focus on more critical issues, such as improving student achievement (Singh & Hiran, 2022).

Nevertheless, the non-significant change in perceived usefulness suggests that participants may have entered the study with a pre-existing belief that GenAI tools benefit educational and professional tasks. Since 80% of the participants had prior experience with GenAI tools (e.g., ChatGPT, Copilot), they have already recognised their value in lesson preparation, solving assignments and tasks, scientific research, and learning resource production. This result aligns with research by Alammari (2024), which found that educators in Saudi Arabia who had prior exposure to GAI exhibited high levels of perceived usefulness and readiness to adopt such tools that motivate them to integrate GAI into their teaching. Additionally, Davis's (1989) Technology Acceptance Model supports the idea that perceived usefulness can be relatively stable if users have already established confidence in the technology's ability to enhance performance.

Moreover, the significant enhancement in the perceived ease of use after the practical experience highlighted the importance of hands-on engagement with technology. In the Saudi context, universities and other institutions such as SADIA make enormous efforts to train teachers on AI principles to keep them up to date with technological advances (SDAIA, 2024). This aligns with the findings of Zhao et al. (2022), who reported that users' proficiency with new technologies improved dramatically when given hands-on, guided experiences. Furthermore, Chen et al. (2020) emphasised the value of instructional support in helping teachers and learners reduce perceived barriers to technology use. Also, the TAM model demonstrates that ease of use is a crucial predictor of technological acceptance, making this study's increase in perceived ease of use very significant. Further, the results revealed that the practical lecture's hands-on approach made GenAI tools seem less complicated than they are, which made educators feel more comfortable with the technology. By helping educators incorporate digital learning materials like videos, images, audio, and visual presentations into their lessons, they can better tailor their instruction to meet their students' needs. This approach ultimately assists students in mastering the subject content. Teachers can enhance lesson plans and materials created by AI, such as ChatGPT, to be effective in their teaching, as AI tools cannot replace or act as substitutes for teachers (Van den Berg & du Plessis, 2023).

Furthermore, the significant positive shift in attitudes toward GenAI indicated that practical exposure makes the GenAI tools more straightforward and cultivates a more positive attitude toward implementing them. Previous research, such as the study by Arvin et al. (2023), noted that educators who receive professional development in AI technologies tend to exhibit more positive attitudes, particularly when they better understand how these tools can enhance teaching and learning. Similarly, Alnasib (2023) found that positive attitudes toward AI in education often correlate with increased familiarity and perceived ease of use. By engaging directly with GenAI tools, participants in this study likely experienced reduced anxiety as they gained firsthand insight into how GenAI could support their professional tasks and ease their production of digital learning resources.

Despite GenAI tools demonstrating strong potential for easing the design and production process of learning resources, participants identified some challenges of GenAI tools during the interview. They reported some language and cultural adaptability challenges. The inability of some tools to fully cater to Arabic language needs and age-appropriate content emerged as a recurring concern, underscoring a gap in localised and culturally sensitive design. The findings align with those of Zaki and Ali (2024), who reported significant linguistic challenges in AI tools. These challenges included the overuse of nominal sentences, frequent verb misuse, pronoun errors, and inconsistent vocabulary repetition.

Furthermore, their study highlighted the significant influence of English on AI-generated Arabic texts, leading to unnatural expressions and syntactic inconsistencies. Teachers can use AI tools to create materials and exercises tailored to their students to increase student engagement. However, they must ensure rigorous quality control to avoid linguistic errors and cultural mismatches (Allaithy & Zaki, 2024). Similarly, Chaka (2024) concluded that there is a significant lack of generative multilingual capabilities in five low-resource languages and suggested the need for more inclusive training datasets for the GenAI models for other languages. These issues are not simply technical flaws but imply the need for a broader view of inclusive AI development. GenAI platforms must evolve to accommodate diverse users—not only in language but also in cultural relevance and educational appropriateness.

6. Conclusion

Given the increase in using AI in education, integrating GenAI tools in the classroom and training teachers on how to use them constructively and safely is vital. This study concludes that hands-on, practical training improves educators' perceptions of GenAI tools, increasing their usefulness, ease of use, and positive attitudes toward adoption. Further, while GenAI tools are appreciated for enhancing efficiency and content quality, challenges like cultural adaptability, formatting, and customisation remain. Further, the findings confirmed that while GenAI tools cannot fully replace traditional methods, they are valuable complementary tools, particularly in time-constrained scenarios. This helps prevent over-reliance on automation and ensures students continue to develop critical thinking, creativity, and analytical skills.

7. Implications and Future Research

Based on the findings, the researcher proposed three recommendations: (1) The integration of GenAI tools in education can be maximised through strategic training and careful application. Strategic training involves learning how to use these tools technically and understanding when, why, and how to use them effectively in specific pedagogical scenarios. Careful application implies aligning the use of GenAI tools with learning objectives and ensuring that their integration supports—not distracts from—student learning; (2) Technology specialists and developers need to address language and cultural barriers by improving support for non-English languages and customising GenAI tools to meet the artistic and pedagogical needs of diverse audiences. Otherwise, language and cultural biases might widen educational gaps and reduce the accessibility of GenAI-assisted

learning for non-English speakers or other communities; (3) Combining the flexibility and quality control of traditional tools with the speed and efficiency of GenAI results offers the advantages of both tools for optimal design outcomes. GenAI tools currently may function best as supportive tools rather than replacements. They serve well for rapid prototyping, ideation, and enhancing visual design, but require human oversight and customisation to ensure educational relevance and audience alignment.

Furthermore, the adoption of GenAI tools in education is still in its early stages, and their long-term impacts on student learning and teaching practices are not yet fully understood. Future studies should explore the long-term effects of GenAI tools on teaching practices and student learning outcomes. Additionally, ethical considerations – such as data privacy, fairness, and intellectual property – must be investigated. Lastly, studies should examine how students use GenAI tools, for example, for homework, writing, or idea generation, and their impact on learning habits, academic integrity, cognitive skills, and educational equity. Finally, this study has three limitations. First, the sample was a small number of participants enrolled in a graduate course; this reduces the generalizability of the findings. Future studies may expand on this work by including more extensive or diverse participant groups. Second, the participants were all from a single college in Saudi Arabia and might not be representative of all students in SA. Third, data were collected from self-reported questionnaires and interviews, thus prone to subjective information.

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Appendix 1

Dear Educator,
Thank you for agreeing to participate in the study and complete this questionnaire. The researcher is conducting a study titled "The Effectiveness of Using GenAI Tools for Developing Digital Learning Resources: Evidence from Educators' Perceptions". The following questions will be used to collect data on your perceptions of using generative artificial intelligence (GenAI) tools to design and produce digital learning resources. Please take a few minutes to answer the following questions. All the information will be kept confidential and will be used for scientific research purposes.

Part 1. Personal information:

1. Number of years of teaching experience:
No experience Less than 5 years 5-10 years more than 10 years

2. Do you have previous experience using GenAI tools?
Yes No

3. Specify your primary uses of GenAI tools:
- Asking general knowledge questions
- Scientific research
- Lesson planning
- Producing learning resources
- Writing articles
- Solving assignments and tasks
- Ask specialized questions in the field of expertise
- Translation
- Proofreading

4. Specify the GenAI tools you used previously:
- ChatGPT
- Other……..

Part 2. Please read the following statements and indicate your agreement or disagreement by choosing one of the five alternatives (Strongly agree = 5, Agree = 4, Neutral = 3, Disagree = 2, strongly disagree = 1).

Perceive the usefulness of GenAI tools:						
Strongly agree = 5, Agree = 4, Neutral = 3, Disagree = 2, strongly disagree = 1						
1	AI-based design tools help improve my performance in designing and producing digital learning resources.					
2	AI-based design tools improve my skills in designing and producing digital learning resources.					
3	AI-based design tools enable me to design and produce digital learning resources faster than traditional tools.					
4	AI-based design tools enable me to design and produce higher-quality digital learning resources.					
5	AI-based design tools help me achieve my learning objectives.					
6	AI-based design tools improve the design quality and production of digital learning resources.					
Ease of usefulness of GenAI tools:						
Strongly agree = 5, Agree = 4, Neutral = 3, Disagree = 2, strongly disagree = 1						
1	AI-based design tools can be easily accessed.					
2	AI-based design tools features quickly follow the instructions.					
3	AI-based design tools are flexible.					
4	AI-based design tools have various features that facilitate my design and production of digital resources for learning.					
5	I found AI-based design tools easy to use.					
Attitudes toward usage of GenAI-based technology						
Strongly agree = 5, Agree = 4, Neutral = 3, Disagree = 2, strongly disagree = 1						
1	I like using AI-based design tools.					
2	I am motivated to learn using AI-based design tools.					
3	I am eager to learn using AI-based design tools to produce digital resources for learning.					
4	I am not bored with learning using AI-based design tools.					
5	I'm interested in learning using AI-based design tools.					