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Exploring the Framework for Intelligent Operations (FiOps) for Teachers in the Era of Generative AI (GenAI)

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Abstract. The education sector has witnessed major changes in the era of generative artificial intelligence (GenAI), since the role of the teacher is not only limited to transferring or presenting information but has also expanded to include multiple roles that are dependent on AI. The framework for teachers' primary operations has changed and become more focused on operations based on GenAI variables. As GenAI is a promising field, it is necessary to identify the areas of the framework for intelligent operations (FiOps) for the teacher, where FiOps relates to the main areas of the teacher's work, including performance operations based on GenAI tools. Therefore, this study aimed to explore the FiOps for teachers in the era of GenAI. The study adopted a phenomenological approach to perform an in-depth analysis of the FiOps domains according to the views of expert teachers on using GenAI. Semi-structured individual interviews were conducted with eight teachers. A focus group was also conducted with the entire group to reach a deep understanding of the expert teachers' thoughts on FiOps. The results show that the main FiOps domains are positioned around four areas: data analysis, program design, guidance and counseling, and discovery and enhancement of capabilities. It has become important to train teachers in the FiOps domains so that they can be more effective and more suitable for work in the era of GenAI.

Keywords: framework for intelligent operations (FiOps); generative artificial intelligence (GenAI); teachers' roles

1. Introduction

The teacher is considered one of the main pillars of the educational process. The teacher contributes to transferring information to students and enhancing their performance skills, and also plays the role of a guide and facilitator in the learning

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process (Yulianto & Haya, 2023). In addition, the roles of teachers have changed in the twenty-first century (Thomas, 2020). One of the roles of teachers in the twenty-first century is to transform and concentrate on the learner, as teachers become more interested in the needs of learners and provide appropriate educational experiences for them (Garcia et al., 2020). In addition, teachers need to have the ability to deal with digital platforms and virtual learning environments (Hayes, 2025), solve problems and encourage students to think critically and solve problems (Grimes, 2025), adapt to rapid technological changes, and deal with emergency situations and crises (Sui et al., 2024).

With the emergence of technological advancement, the so-called generative artificial intelligence (GenAI) emerged, which is a technology that enables and helps computers simulate human intelligence by solving problems through natural language analysis (Al-Abdullatif, 2024; Gu, 2024). GenAI is a rapidly developing area with great potential in numerous fields, including education (Gu, 2024; Ogunleye et al., 2024; Salinas-Navarro et al., 2024). GenAI has a high potential to make life easier, as the development of AI technology will affect people's lives, work, and studies, providing benefits and conveniences to them (Dai, 2024). In addition, it can solve problems, teach languages (Shrivastava et al., 2024), and recognize and process languages (Dai, 2024).

The importance of GenAI lies in saving teachers' time and improving their performance (Tahir et al., 2024). That is, it helps teachers prepare and plan lessons and provide different ways of learning (Jayasinghe, 2024). GenAI can also be used to generate educational content, create and share important and interesting information for students, improve learning outcomes (Haroud & Saqri, 2025), and create an encouraging environment for students (Begum, 2024). Several studies have addressed the importance of GenAI for teachers, such as Mujiono (2023), with the results showing that AI plays an essential role in the educational process as it contributes to the quality of education by supporting teachers and making lessons more effective.

A study conducted by Cukurova et al. (2023) to determine factors affecting teachers' engagement in the era of AI proved that GenAI contributes to enhancing engagement, reducing the workload on teachers, and assisting with academic work. Another study, conducted by Ng et al. (2025), has indicated that GenAI helps teachers provide learners with innovative solutions to enhance their teaching practices and perform tasks that reduce teachers' work, such as grading assignments, providing personalized feedback to students, and preparing lessons.

The research gap in defining the FiOps for teachers can be identified through the perspective of teachers themselves, especially those who have experience using GenAI tools. In a related context, many studies have recommended the need to address the future roles of teachers in the era of GenAI (Celik et al., 2022). Since GenAI has influenced teachers' roles and teaching practices, it has become essential to conduct research to reveal teachers' roles and frameworks in the era of GenAI (Al-Hafdi & AlNajdi, 2024). The educational landscape has changed with the emergence of GenAI applications such as ChatGPT, which means that

new roles and processes are required for today's educators (López-Fernández & Vergaz, 2024). In relation to teachers, FiOps means the fundamental tasks and processes that depend on AI and that the teacher can perform to improve the educational environment and learning outcomes. There is a perceived lack of studies that have addressed this teachers' framework in the context of GenAI tools based on what the teachers themselves have observed. It is thus important to conduct a qualitative study to explore the opinions of the most experienced teachers in using GenAI tools to identify the components of FiOps from their own point of view.

Accordingly, personal interviews were conducted using the phenomenological approach to investigate the perspectives of practicing teachers who have used GenAI. The aim was to identify the lessons learned and gain deep, reliable insights to reach specific conclusions to expand the GenAI experience and support teachers who have not used this technology. The goal was to construct a framework that enhances the goals and roles of GenAI tools in the educational process and help decision-makers understand the requirements for employing GenAI in the educational process.

Thus, the main research question was: What are practicing teachers' perceptions of the FiOps for teachers in the era of GenAI? The results of this research may contribute to supporting those who are responsible for employing GenAI in education with a guide that contains the most important key processes for opportunities that boost teachers' performance in relation to their roles in the era of GenAI.

2. Literature Review

2.1 The Foundations of GenAI in Education

The evolution and progression of chatbots – from their simple beginnings as digital assistants with limited functionality to their current state as tools capable of simulating complex human dialogue through so-called GenAI – shows the relentless drive to simulate human conversation (Jo, 2023). GenAI is a kind of intelligence that can generate new content by itself, such as text, images, audio, and video, providing innovative ways to create content, improve the search experience, and reshape how information is generated and presented so that it becomes new entry points for online traffic (Lv, 2023).

GenAI has emerged as one of the most significant technical elements of this era through its ability to imitate human functions such as thinking, learning, planning, and creativity (Băjenescu, 2024). In addition to its ability to deal with and adapt to rapid changes, it can develop societies through an educational system that relies on learning, reasoning, and guidance (Wang et al., 2024). Artificial intelligence includes systems and programs that simulate human intellectual functions, such as the ability to think and learn (Chen et al., 2020).

In the same context, GenAI works to increase efficiency and productivity in various fields by automating processes and reducing human interference (Al Naqbi et al., 2024). At the educational level, the value of AI in education lies

in preparing content and assignments (Tahir et al., 2024) and improving the quality of teaching and building knowledge through collaborative activities (Ramirez & Esparrell, 2024). It also improves educational outcomes for students (Gary, 2024), creates immersive educational data, enhances student engagement (Eden et al., 2024), and improves cooperation between teachers and students to achieve educational success (Mafara & Abdullahi, 2024).

Several studies have proven the significance of GenAI in the educational field through its ability to bring about key and thoughtful changes in education. For example, Cueva et al. (2024) conducted a systematic review of 240 articles to investigate the use of emerging technologies and GenAI in higher education to improve the quality of teaching and learning. The findings show that the integration of GenAI is a crucial step in enhancing the quality and effectiveness of teaching, and that GenAI helps to increase students' performance. Tahir et al. (2024) established an increasing use of GenAI in numerous fields, including education.

AI applications are used in education to perform functions such as content preparation, assignment preparation, automated assessment, and student assistance. The benefits include creating greater flexibility in time and place, changing the teacher into a facilitator, and bridging educational gaps by accessing appropriate learning resources for each student, enabling faster and more efficient learning. The study concluded that the role of AI in education will increase in the future (Tahir et al., 2024).

Furthermore, the study by Ramirez and Esparrell (2024) showed that GenAI can revolutionize the field of education by developing adaptive learning and problem-solving skills. Eden et al. (2024) found that GenAI has the potential to improve students' engagement and raise their cognitive level. Another study (Mafara & Abdullahi, 2024) showed that GenAI helps with individual learning, monitoring of student performance, and automating teaching duties such as feedback and evaluation. Zhou (2024) found that the advancement of computers and technology, including GenAI, has created new opportunities in the field of education, as AI has become a supporting tool in education.

In addition, a study by Bajpai (2024) aimed to determine the impact of GenAI in education. The results show that GenAI has an impact on improving the quality of teaching and learning, and moreover, it gives teachers the ability to perform administrative tasks more effectively. The study by Nurjanah et al. (2024) investigated and analyzed the work of GenAI in the teaching and learning process, focusing on its influence on teaching and learning. The study found that GenAI improves learning experiences, increases efficiency, and increases educational practices. There are significant positive associations between the ability of GenAI tools to support information and knowledge acquisition and thus shape users' intention to use GenAI (Jo & Park, 2024).

2.2 Emerging Frameworks and Teacher Roles in the GenAI Era

As GenAI becomes increasingly integrated into education, it is essential to evaluate the core intelligent processes of the FiOps for teachers in this new context, since teachers remain a central part of learning despite the rise of AI technologies (Alsayed et al., 2024a). Identifying key factors for the use of GenAI applications in education is a critical factor for the implementation of intelligent practices by teachers in the educational context (Jo, 2023). The teacher is the one through whom intelligent learning processes are administered (Al-Hafdi & AlNajdi, 2024).

With the multiplicity of sources of intelligent information, the role of the teacher remains crucial (Hamdana et al., 2023). FiOps represent a special vision of teachers' views on the intelligent processes that the teacher should practice in the AI era. Many studies have emphasized the importance of the teacher's role and the processes they perform inside the classroom, as their role is indispensable in improving students' performance and supporting their participation as well as stimulating higher-order thinking skills (Thomas, 2020).

Inside the classroom, the teacher is also a facilitator and leader or guide (Yulianto & Haya, 2023) and a creator of attractive educational environments for students (Pedler et al., 2020). However, with the recent emergence of GenAI and its increasing impact on teachers' roles and assigned tasks, it has become vital to consider the fundamental operations that a teacher can perform by leveraging GenAI beyond mere teaching and assessment (Grubaugh & Levitt, 2023). The integration of GenAI into classrooms brings about a standard shift, which requires a major change in the roles and frameworks of the teacher (Alsayed et al., 2024b; Zhang et al., 2023).

It can be said that GenAI can support the teacher by performing many tasks, such as grading, providing immediate feedback and comments to students, and providing learning analytics that provide valuable insights into students and their performance (Lo et al., 2025). GenAI tools also enhance education in the technological age, bridge the gap between theory and practice, and enhance general culture (Belkina et al., 2025). Celik et al. (2022) have also shown that GenAI provides teachers with many opportunities to improve planning by identifying student needs, informing teachers of these needs, implementing through immediate feedback, facilitating teacher intervention, and assessing through automatic essay grading.

The study also showed the various process frameworks for teachers in improving GenAI technology. These processes include designing patterns to train AI algorithms and participating in AI development by verifying the accuracy of AI-automated evaluation systems. The results of Mujiono (2023) showed that cooperation between teachers and AI can increase learning effectiveness and individualized learning for students. However, teachers still play a crucial role in guiding and inspiring students. Therefore, careful collaboration between teachers and GenAI is vital for a more beneficial learning experience. In general, new technologies often reshape current and future teacher roles (Alnimran &

Alhalafawy, 2024; Alrashedi, Alsulami et al., 2024; Alrashedi, Najmi, & Alhalafawy, 2024; Ibrahim et al., 2024; Najmi et al., 2024; Saleem et al., 2024; Zaki, El-Refai, Alharthi, et al., 2024; Zaki, El-Refai, Najmi, et al., 2024; Zohdi et al., 2024).

The significance of FiOps is greatly enhanced when viewed within the context of the technological pedagogical content knowledge (TPACK) framework. The TPACK model represents a well-established framework for understanding the complex knowledge teachers need to successfully integrate technology into teaching (Mishra et al., 2023). This model encompasses three core knowledge domains: content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK) (Rodríguez Moreno et al., 2019). It also includes the intersections among them, which form technological content knowledge (TCK), technological pedagogical knowledge (TPK), pedagogical content knowledge (PCK), and finally, TPACK itself (Handayani et al., 2023). In this context, FiOps offers a new and specific lens for the operations teachers must perform with the advent of GenAI, complementing and deepening the profound understanding of how teachers embody TPACK knowledge in actual practices.

While TPACK describes what a teacher needs to know to effectively integrate technology, FiOps focuses on what a teacher needs to do through intelligent operations supported by GenAI. FiOps can be considered a practical application of TPACK components in the digital age. For instance, technological knowledge (TK) within TPACK expands to include understanding GenAI and how it functions, while technological content knowledge (TCK) translates into the teacher's ability to use GenAI to design innovative and personalized educational content. Similarly, technological pedagogical knowledge (TPK) evolves to encompass the teacher's intelligent operations in leveraging GenAI to adapt teaching and assessment strategies, provide immediate feedback, and analyze student learning data—all processes that FiOps focuses on.

Consequently, FiOps aligns seamlessly with TPACK, representing an expansion and specification of the skills and operations necessary for teachers to master the new dimensions imposed by GenAI within each TPACK dimension. It particularly supports the overarching concept of TPACK as a framework for integrating the knowledge required for effective teaching supported by advanced technology.

3. Methodology

3.1 Approach

This study aimed to investigate the perspectives of experts regarding the FiOps for educators in the GenAI era. A qualitative design, specifically a phenomenological inquiry, was employed to gather comprehensive and granular data pertinent to the research question (Tomaszewski et al., 2020). Data collection involved conducting several semi-structured individual interviews along with one focus group, all centered on the fundamental FiOps for teachers amid the rise of GenAI. This methodological choice is well-suited for investigations seeking rich insights from individuals connected to the research topic. It facilitates the analysis and structuring of this information using interpretive techniques grounded in

participants' narratives, connecting these insights to relevant educational theories and prior scholarly works, thereby fostering a profound grasp of the research problem (Smith & Nizza, 2022). Furthermore, this methodology provides an extensive and detailed understanding of processes and underlying reasons through insightful discoveries (Smith & Nizza, 2022). The present research endeavored to achieve this by delineating the components of the smart operations framework for teachers, informed by their lived experiences.

3.2 Participants

The participants in this study were carefully selected employing the intentional sampling of expert teachers who teach and train using GenAI. The teachers were selected according to a set of criteria. First, their specialization had to be in computer science or digital skills. Second, they had to have a relevant postgraduate qualification, such as a master's degree in e-learning, a master's degree in educational technology, or a diploma in digital skills. Third, they had to have experience in using GenAI. These criteria for selecting participants were set to ensure the provision of in-depth data that contribute to reaching a better and more detailed understanding that would lead to addressing the research question.

This method of selecting participants based on strict conditions and criteria helped in obtaining comprehensive and diverse data to address the study problem (Churchill, 2022). The sample consisted of eight expert teachers from public education schools in the Makkah Al-Mukarramah region. This number was appropriate for the context and dimensions of the study and the desired goal and was appropriate for reaching data saturation (Tomaszewski et al., 2020). Semi-structured individual interviews were conducted with the eight participants, while one focus group was conducted with all eight participants. Table 1 shows the characteristics of the participants.

Table 1: Characteristics of the expert teachers participating in the study

Expert teacher	Age (years)	Gender	Qualification	Job	Experience in GenAI	Years of experience
T1	43	Male	PhD	Computer teacher	ChatGPT, - Google Bard	4 years
T2	38	Female	MA	Math teacher	ChatGPT, Thinkster Math	3 years
T3	42	Male	BA	Technical trainer	ChatGPT, Canva AI	5 years
T4	36	Male	PhD	Computer teacher	Century, Matific	6 years
T5	32	Male	MA	Science teacher	ChatGPT, Edpuzzle	2 years
T6	38	Female	BA	Language teacher	Pear Deck, Duolingo AI	3 years
T7	47	Male	PhD	Science teacher	Perplexity	7 years
T8	40	Female	MA	Science teacher	Knewton	7 years

3.3 Data Collection Tool

In this study, semi-structured interviews and focus groups were used to collect data from participants who are expert trainers and teachers in GenAI and to explore their perceptions and experiences of the FiOps for teachers in the GenAI era. As qualitative research instruments, semi-structured interviews and focus groups are employed to collect data on attitudes and experiences pertinent to specific topics. They are effective in exploring qualitative methodologies and causal relationships, concurrently providing the researcher an opportunity to delve into the phenomenon by capturing an array of responses and distinct participant outlooks (Sholokhova et al., 2022).

The semi-structured interviews and focus group considered a number of topics related to the roles of teachers who depend on AI in the GenAI era, such as teachers' experiences in employing GenAI in the classroom, the reasons for using it, how it is used, the extent to which it contributes to developing the learning environment, and how students interact and are active with it. Probing questions were used during the interviews (Smith & Fieldsend, 2021). For example: Explain your answer to me more clearly. Do you have an example of that? Can you mention more details? What do you mean by this phrase? Are there any additions you would like to talk about?

Achieving thematic saturation is a vital aspect of ensuring the reliability and quality of qualitative data. In this study, we followed a rigorous methodology to assess saturation during data collection. After reviewing the framework by Guest et al. (2006) on determining saturation, we implemented an iterative strategy of simultaneous data collection and analysis. We began with initial sets of interviews, and after each set, we conducted a preliminary analysis of the data to identify emerging patterns and themes. The data collection process (interviews) continued until we observed a recurrence of ideas and concepts put forth by participants, with very few new themes or ideas emerging.

For example, after conducting interview number 8, we noticed that ideas related to guidance and counseling began to repeat without adding substantial new information, and that ideas about the teacher's role as a designer of AI-supported educational programs had been sufficiently explored by previous participants. At this point, and when it became clear that additional interviews were no longer enriching our understanding of the core concepts or revealing new dimensions of the research problem, we determined that thematic saturation had been achieved, allowing us to confidently proceed to the final data analysis phase.

3.4 Reliability

The quality and trustworthiness of study findings are fundamentally supported by robust reliability measures (Creswell & Poth, 2018). In qualitative research, reliability correlates with the quantitative concepts of validity and dependability (Smith & Nizza, 2022). Key facets of qualitative reliability include credibility, dependability, and confirmability (Williams, 2021). To meet these essential criteria in this study, the principle of triangulation was applied for credibility. This involved the use of multiple data sources, such as diverse researchers or various data collection tools (Smith & Fieldsend, 2021). This study utilized two

instruments: semi-structured interviews and a focus group. To validate the analysis, the research team's data interpretations were reviewed by a qualitative research expert, with whom agreement was reached on the coding, categories, and emergent themes (Sholokhova et al., 2022). For confirmability, the initial and follow-up questions from the study instruments were presented to two domain experts. Their feedback on question appropriateness, clarity, and alignment with study aims was integrated, leading to the necessary adjustments (Churchill, 2022).

3.5 Procedures

3.5.1 *Ethical procedures*

Prior to engaging teachers, all requisite approvals were secured from the college and the local educational administration. Participants received comprehensive information regarding the purpose, aims, and relevance of the investigation, leading to their informed agreement to take part. Their rights, including the freedom to participate or withdraw at any point, were clearly communicated. The interviews and focus group session were scheduled to align with the participants' availability. Privacy considerations were emphasized, ensuring that identities would remain confidential through the use of symbolic references instead of personal names (Brown, 2022). Furthermore, participants were guaranteed the confidentiality of all shared data. Each semi-structured interview was planned to last no more than thirty minutes, and the focus group interview session was capped at two hours.

3.5.2 *Implementation procedures*

A group was created on WhatsApp, and the participants in the interviews and focus group were included in this group. After that, they were coordinated to hold a meeting via the Zoom platform, with the aim of determining the appropriate time for each participant to be interviewed. Participants were informed that the interviews and focus group would be conducted online, to refer to the interview recordings, as well as to facilitate the process for participants. After determining the appropriate time for each participant, the interviews were conducted separately over a one-week period. The focus group interview was conducted later and lasted for two hours on one day.

3.6 Data Analysis

Upon concluding the data collection, the subsequent phase involved the qualitative analysis of the data gathered from participants, employing thematic analysis. This analytical approach facilitates the organization of data, its categorization into distinct groups, and the subsequent classification of these into sub-themes and overarching themes. This process is crucial for comprehending the data and assigning appropriate meanings and interpretations based on its respective contexts (Creswell & Poth, 2018).

The methodology adopted for data analysis comprised six sequential stages: 1) data immersion, where the research team meticulously reviewed recorded interviews to gain a thorough understanding; 2) code and theme identification using NVivo software, resulting in 60 distinct codes from independently analyzed interviews; 3) theme development, confirming consistency of codes with participant statements and interview dimensions; 4) theme refinement, involving

exploring relationships, consolidating similarities, and eliminating redundancies; 5) categorization and sub-theme formation, distributing codes into interconnected categories and forming themes relevant to the study questions; and finally, 6) comprehensive analysis and reporting of the established themes. To ensure the quality and validity of the analysis, findings were presented to both study participants for authentication and specialized experts for their review and feedback (Braun & Clarke, 2021).

The data analysis generated four main themes: data analysis, program design, guidance and counseling, and discovery and enhancement of capabilities. These four themes together represent the FiOps axes that the teacher performed in the GenAI era, as shown in Figure 1.

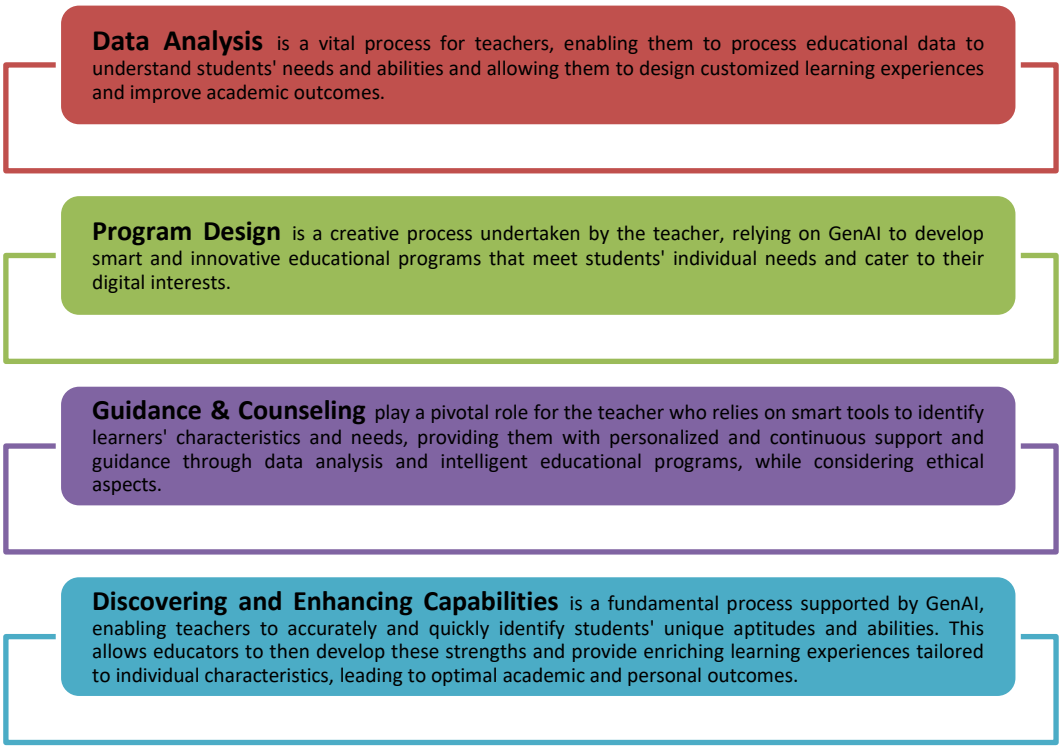

Figure 1: FiOps for teachers in the era of GenAI

4. Results and Discussion

The results of this study led to a framework based on the perspectives of expert teachers in the use of AI. The framework was based on four main areas: data analysis, program design, guidance and counseling, and discovery and enhancement of capabilities, as shown in Figure 1. The figure shows the FiOps areas in the GenAI era according to the perspectives of the GenAI expert teachers. These basic areas for discussion are presented below.

4.1 Data Analysis

In the GenAI era, it has become vital that the basic operations performed by the teacher are based on the analysis of educational data, and to be able to process the data and then develop methods for improving learning outcomes according to the

various data analysis operations performed. In this context, one of the participants stated:

> "*Comprehensive data analysis has helped me a lot in customizing education to suit the needs of each student. Thanks to this analysis, I can understand the level and needs of each student more accurately, which allows me to modify the educational content to suit everyone. This customization clearly leads to improving the academic performance and progress of students.*" (T1)

Another participant stated:

> "*Using AI tools to analyze data has made a huge difference in my teaching strategies. This analysis has helped me gain a deeper understanding of my students' strengths and weaknesses and identify the learning styles that really suit them. This understanding enables me to adapt my teaching methods to better meet the needs of each student, thus achieving more effective learning outcomes.*" (T3)

The two examples illustrate how GenAI applications have improved the practice of data analysis processes, which have contributed to individualizing and customizing education for learners. They have also enabled teachers to practice reshaping content according to learners' characteristics. In addition, GenAI applications have also made teachers more capable of identifying learning styles and diversifying teaching methods. This clearly demonstrates how educational data analysis has become one of the most important pillars of the intelligent processes that teachers apply in the era of GenAI.

Another participant emphasized the importance of data analysis in the era of GenAI and that it is among the most important tasks of the profession today. It helps teachers to understand the deep needs of students and support their abilities, thus enhancing the teacher's ability to design personalized experiences for students. The participant stated the following:

> "*I can see that the role of the teacher today has greatly exceeded the scope of traditional teaching, to the point that it is no longer limited to just transferring knowledge. Reasonably, it includes a variety of smart tasks. The teacher has become able to effectively use educational data analysis to understand the deep needs of students and identify their unique abilities. Through this, the teacher can design personalized learning experiences that are in line with the different learning styles of each student, which enhances academic performance and supports the personal and cognitive growth of students.*" (T2)

The current result is consistent with what previous studies have indicated, which showed the importance of teachers acquiring educational data analysis skills, especially in the GenAI era (Wu et al., 2023). The current result is also consistent with what was emphasized by Ndukwe and Daniel (2020), who explained the increasing need for teachers to have educational data analysis skills due to its importance, as they analyze and interpret data to inform their teaching practices. This emphasizes the importance of engaging in analytics to enhance classroom effectiveness, improve teaching strategies, and improve overall outcomes. The use

of GenAI can help automate educational tasks, process large amounts of data based on processes, and provide predictive insights that lead to more innovative knowledge (Ruiz-Rojas et al., 2023).

Data analysis supports teachers in making decisions based on genuine academic data, monitoring, and analysis (García-Peñalvo et al., 2018; Shum & Ferguson, 2012). It also helps in prediction and early intervention (Agudo-Peregrina et al., 2014; García-Peñalvo et al., 2018; Zheng et al., 2021), enhances assessment and feedback processes (Yang et al., 2020), and promotes the individualization of instruction (Doroudi & Brunskill, 2019). In addition, it promotes improving the adaptation, personalization, and reconstruction of educational content according to educational needs (du Plooy et al., 2024), retaining learners and preventing their dropout (field et al., 2018), and improving the processes of intensive online training (Andres et al., 2018; Cobos et al., 2016).

4.2 Program Design

While designing educational programs may be one of the basic processes that teachers perform under all normal circumstances, it can be said that designing programs in the GenAI era have become more innovative and dependent on GenAI at present. Designing programs according to GenAI variables leads to the development of quality programs that have a great ability to meet learners' needs. In this regard, one participant stated:

> "*Generative AI helps us as teachers to create smart software capable of distinguishing differences between students, as artificial intelligence can analyze huge amounts of data quickly and effectively, which contributes to identifying individual differences between students and providing personalized education that meets the needs of each of them.*" (T5)

One participant justified the need to depend on designing programs according to GenAI:

> "*Creativity in designing lessons is very important in order to attract the attention of the new digital generation, as this generation grew up in an environment that relies heavily on technology, so using multimedia and interactive applications contributes to making the learning process more attractive and appropriate to their digital interests.*" (T4)

The use of GenAI by teachers in designing and innovating educational programs has become very important. This is consistent with the study by Silva-Jurado and Silva-Jurado (2024), who emphasized the design and innovation roles of teachers based on AI technologies and their importance in enhancing the educational process. It also agrees with Panday-Shukla (2025), who highlighted the fundamental role of teachers in designing educational programs that integrate AI tools into the educational program environment.

In particular, designing educational programs and processes is one of the most important educational skills that enhance learning outcomes according to students' abilities, desires, and inclinations (Chen et al., 2022). As teachers work as facilitators of the educational process in the GenAI era, design thinking for educational programs has become focused on employing AI to adapt content and

meet digital needs (Gopinathan et al., 2021). GenAI can improve and support learners by generating new and imaginative content, and this enhancement of creative capabilities not only expands the horizons of education but may also contribute to the development of learners' skills through innovative educational programs developed using GenAI (Ivanov et al., 2024). This is consistent with GenAI becoming more capable of generating new content rich in digital media. Not only that, but it can be said that GenAI applications are becoming more capable of generating high-quality, contextually relevant content that is almost indistinguishable from work that can be developed by humans, which enhances their use in personal environments (Banh & Strobel, 2023).

4.3 Guidance and Counseling

Guidance and counseling has remained one of the main axes of teachers' operations throughout the ages. However, in the GenAI era, guidance and counseling have become dependent on more intelligent tools that can identify the characteristics and requirements of the learner. It also involves data analysis and connection to the learning environment through smart educational programs. While GenAI has provided teachers with intelligent tools to improve guidance and counseling processes, GenAI tools themselves need guidance on the mechanisms of optimal use and consideration of the ethical aspects associated with them. In this context, one participant stated:

> *"In this current era, by depending on smart technology, the teacher plays an important role in guiding and counseling students in many aspects, including choosing available educational resources and avoiding inaccurate or inappropriate information, as it is important for students to learn how to identify reliable and useful sources, as well as to consider ethical boundaries."* (T8)

Another participant added:

> *"The teacher's role has become to provide support and guidance throughout the educational journey, as the availability of information online changes the teacher's role from a content transmitter to a guide who helps students direct the knowledge they acquire and develop their critical thinking skills."* (T6)

The teacher in the era of GenAI therefore has a major operational role in terms of employing GenAI to provide personalized guidance, support, and feedback, thus increasing the efficiency of the educational process (Giannakos et al., 2025). GenAI provides unique tools that increase the teacher's qualitative roles in providing the necessary support and guidance to learners (de Oliveira Lima et al., 2024). GenAI enables educators to deliver continuous support and guidance by utilizing tools specifically designed to enhance their ability to assist students effectively (Alsayed et al., 2024a).

Relying on GenAI in guidance and counseling processes supports the teacher with qualitative tools and services, such as personalized learning, automated assessment, feedback generation, virtual assistants, chatbots, content creation, resource recommendation, time management, and research support and assistance (Nikolopoulou, 2024). GenAI contributes to improving guidance and

counseling by contributing to the creation of highly personalized educational materials, as well as assessments and feedback designed for each learner (Chiu, 2023). This is consistent with the study by Gómez Cano and Colala Troya (2023), which confirmed that AI tools effectively adapt content to meet the needs of individual students, allowing teachers to focus on the guidance process. Cota-Rivera et al. (2024) stated that providing adaptive learning experiences and personalized guidance based on AI technology is one of the guidance and counseling roles of teachers.

The results of the study by Alsayed et al. (2024a) also showed that employing GenAI in education contributes to providing multiple opportunities that support the teacher in practicing guidance and counseling processes. In addition, it increases the efficiency of guidance and counseling through GenAI's ability to make guidance and support more flexible, motivate learners to seek support, and provide support and guidance without interruption.

4.4 Discovering and Enhancing Capabilities

GenAI has significantly helped in developing the basic processes of discovering and enhancing learners' capabilities, as GenAI has enabled the use of tools that allow teachers to identify learners with abilities and competencies and then work to increase them and provide a rich educational experience that suits the characteristics of the learners. One participant stated:

> *"Generative intelligence techniques have assisted me to identify students' tendencies more quickly. Thanks to the available analytical tools, which quickly reveal their interests and educational preferences. This enables teachers to adjust teaching methods to suit these tendencies."* (T4)

Another participant added:

> *"Nowadays, generative AI allows teachers to identify the areas in which each student excels and work to enhance those individual skills. Through these tools, we can identify students' strengths and support them in developing their own talents, which contributes to achieving greater successes on both the academic and personal levels."* (T7)

This result is consistent with the results of several studies that have shown the roles of GenAI in discovering and enhancing learners' abilities (Bezzina & Dingli, 2024). GenAI tools can enable teachers to customize and adapt personal learning experiences, allowing them to discover and enhance students' abilities effectively (Umar, 2024). Several experiments have been conducted using GenAI, which have confirmed that these tools have great capacity to develop learners' abilities, especially when used under the supervision of teachers (Jin et al., 2024).

GenAI technology plays a chief role in discovering learners' qualitative abilities and improving and developing skills in various ways. GenAI works through mechanisms based on learning practice and experience, progress towards achievement, and the continuity of the training process to improve and develop awareness and skills (Alsayed et al., 2024a). With GenAI, teachers can spend more time assisting learners to improve rather than checking on tasks and assignments that learners have completed. Using GenAI tools, learners and teachers can

engage in a series of subtasks to arrive at solutions that ultimately integrate high-level outcomes and skills (Cañavate et al., 2025). GenAI can detect unexpected learning behaviors and identify successful learning patterns, in addition to detecting incomplete learning processes, providing appropriate interventions, and increasing users' awareness of their progress and actions based on a comprehensive and accurate analysis (Alsayed et al., 2024a).

5. Implications

The study's findings on teachers' intelligent operations in the GenAI era offer significant practical insights for various stakeholders in the educational system.

5.1 Teacher Training Programs

Teacher preparation and professional development programs should explicitly include training modules focused on how teachers can utilize GenAI tools for educational data analysis, customizing education, and identifying students' strengths and weaknesses. Training courses should incorporate practical units on designing and developing innovative and interactive educational content using GenAI. Furthermore, training programs should emphasize using GenAI to provide personalized guidance, continuous support, and immediate feedback to students, while considering ethical use.

Additionally, teachers should be equipped with GenAI tools and strategies to identify and develop students' talents and interests, and design customized learning experiences. These training programs should link these new operations with current TPACK skills, ensuring a comprehensive integration of theoretical knowledge and practical application.

5.2 School Leadership

School leaders must ensure the availability of robust technological infrastructure and necessary GenAI tools to support teachers in effectively implementing these intelligent operations. They should also allocate sufficient budgets and time for regular professional development programs focused on integrating GenAI into educational practices, based on the operations identified in this research. School leaders can foster a culture of collaboration among teachers to share best practices and experiences in using GenAI, supporting continuous innovation. Frameworks for evaluating teacher performance and support systems should be re-evaluated to include their competencies in using GenAI for personalizing education, providing feedback, and supporting student growth.

5.3 Educational Policy-Makers

Policymakers should formulate national frameworks outlining the competencies required by teachers in using GenAI across the identified operations (data analysis, program design, guidance and counseling, discovery of capabilities). Governments and educational institutions should allocate funding to support further research on best practices in integrating GenAI into education, and to develop specialized tools and resources. Policymakers must establish clear guidelines for the ethical and responsible use of generative AI in educational settings, with a focus on protecting student data and ensuring fairness. Curricula

should also be reviewed to ensure they prepare students not only to use GenAI but also to learn in environments facilitated by GenAI-using teachers. By addressing these practical implications, stakeholders can ensure that the education system fully leverages the potential of generative AI to improve teaching practices and student learning outcomes.

6. Limitations

The study has achieved important results related to the areas of FiOps that teachers can perform in the era of GenAI. Nevertheless, it is important to note that the study relied on a sample of teachers who were very experienced in using GenAI, which means that the results may not necessarily reflect the views of all teachers in different educational contexts. Although the sample size was small (N = 8), saturation in the responses of the participants was reached, which is possible for such a small sample size in qualitative research (Guest et al., 2006). However, it may be feasible to conduct other studies with different teacher characteristics, which may contribute to obtaining results in other areas.

7. Conclusion

The major objective of the current study was to identify the components of FiOps that teachers perform in the GenAI era. The results showed, as explained by the participating expert educators, that the most important areas of FiOps are based on data analysis, program design, guidance and counseling, and discovery and enhancement of capabilities. These areas that are based on AI can positively impact teachers' performance if they are generalized and teachers' capabilities are developed considering them, which can reflect positively on the outcomes of the educational process. GenAI has redesigned the role of the teacher to include more complex roles, where the teacher is no longer just a transmitter of knowledge.

These new roles include analyzing educational data, designing innovative educational programs, offering guidance and counseling, and guiding students toward achieving their full potential. These roles are not limited to improving the quality of education but also contribute to enhancing the learning experience in a more comprehensive way, as AI enables teachers to provide more personalized education. Considering these results, the institutions concerned should work on enhancing the smart competencies of teachers and providing them with the appropriate tools to exploit the capabilities of GenAI efficiently.

Developing teachers' skills according to GenAI is essential to raise the level of education and prepare a generation of students capable of adapting to future challenges. Future studies should focus on the mechanisms that can be implemented to effectively integrate GenAI into education. It is also necessary to study the limitations and challenges that hinder the optimal use of GenAI in education.

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