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Degree of teachers' adaptation to digital skills sustainable development

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Abstract

The study aimed to assess how teachers adapt to digital skills for sustainable development in education. This study involved 10 teachers from various departments with pre- and post-interviews to evaluate their adaptation levels using qualitative methods. A tool with three open-ended questions was developed and its validity and reliability were confirmed. The findings revealed that teachers require significant improvement in digital skills to enhance their teaching, stressing the importance of offering updated training programs that integrate digitalization into education. Some teachers showed low adaptation to digital skills due to limited awareness and unfamiliarity with digital tools. The study highlights the need for ongoing professional development to address gaps in digital competence and support the integration of digital tools in teaching. Practical recommendations include in-service teacher training focused on digital applications, equipping institutions with necessary technological resources and fostering an environment conducive to digital integration. Addressing these needs will help teachers adapt better to digital practices, ultimately improving education quality and aligning with sustainable development goals. This study emphasizes the importance of aligning educational practices with global trends toward digital transformation and sustainable development by enhancing teachers' digital competence.

Keywords: Teachers' adaptation, Digital skills, Sustainable development, Educational technology, Digital competencies, Teacher professional development.

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Contents

Contribution of this paper to the literature

This study is distinguished by its focus on assessing teachers' adaptation to digital skills for sustainable development in education. It highlights the lack of awareness of digital tools among teachers and emphasizes the importance of providing ongoing, tailored professional development programs to address this gap and enhance their adaptation to digital tools in teaching.

1. Introduction

The world is experiencing tremendous technological advances in all industries including education. The advent of the digital revolution has altered learning settings into dynamic and interactive spaces. As a result, teacher professional development is becoming increasingly important as teachers must be able to manage and generate digital material while using a variety of digital tools and platforms both within and outside the classroom. Teacher professional development programs play an important role in achieving digital transformation in education by providing teachers with the skills and knowledge they need to manage the difficulties of the digital era. Teachers' professional development not only improves their performance but also helps students learn allowing them to adapt to current developments and the rising use of technology in education.

Numerous studies have stressed the need for professional development in preparing teachers for digital learning. For example, Ayvaz-Tuncel and Çobanoğlu (2018) emphasized the necessity of teacher development for the success of e-learning whereas Yue (2019) emphasized the need for professional development to enhance teaching effectiveness and equip instructors with 21st-century abilities. According to Copriady, Zulnaidi, and Alimin (2018), in-service training programs can assist instructors in grasping digital skills and improve their interactions with digital environments. Despite the advantages of digital learning, its success is dependent on collaboration among educational institutions, communication firms, and community groups as highlighted by Zawacki-Richter and Bozkurt (2019).

This study aims to assess the level of adaptation of teachers to the skills required of a digital teacher in the context of sustainable professional development. It seeks to identify the challenges teachers face in acquiring these digital skills and to provide recommendations for enhancing teacher training programs to support digital transformation in education. The objectives of this study were to understand instructors' levels of adaptability to digital teaching abilities in the context of long-term professional growth. It may assist us in determining teachers' levels of adaptability, acceptance, and usage of digital learning abilities in the educational process.

This study investigates the level of adaptation of teachers to the skills of the digital teacher in the light of sustainable professional development and the challenges facing them and given the importance of digital learning in the educational-learning process which is evident in increasing the effectiveness of teaching. Digital learning has become an integral part of the educational-learning process to continue the educational process. Teachers should integrate digitization and its uses in the educational process in modern and advanced methods as the matter of switching to digital education is not an optional shift of our free will, the idea was born in the researcher of the need to reveal the level of integration and adaptation of teachers with digitization in education and the most important challenges facing them to reduce it, believing that digitization achieves the continuity of the educational process to enter the world of education in the digital age and face challenges so that the teacher can enter, integrate, create and deal effectively with technological means with the need to change the stereotype of education. Based on the recommendations of some previous studies such as Yue (2019) these objectives guided the formulation of the research questions:

RQ1: How do degrees of teachers' adaptation to digital skills affect sustainable development?

RQ2: What is the relationship between the teacher's specialization from his point of view and the degree of interaction with digitization in education and its acceptance and adaptation?

RQ3: How do the degree of awareness of parents and the surrounding environment reflect on the teacher's acceptance and adaptation to digital learning and keeping pace with the digital age and its requirements?

The contribution of teachers in the educational process is the cornerstone of its success. Therefore, educational institutions should work to update teacher training and qualification programs to enable them to exercise multiple roles (Nasr, 2008). Digital learning improved the quality of education through digital technologies and overcoming many of the disadvantages and problems of traditional learning and contributes to raising the capacity of absorption (National Education Policy Center, 2019).

Many studies have emphasized the importance of teachers acquiring modern digital professional development before entering the teaching profession. For instance, Adipat (2021) highlighted that improving teachers' digital learning skills positively impacts their performance, benefits students and enhances their outcomes.

This is congruent with the European Training Foundation's recent assessment on teacher continuous professional development which found that digital teacher skills are one of the most commonly used professional development activities.

Some studies confirm that the digital divide among teachers hinders the benefit from digital learning applications in education. For example, the study by Safta-Zecheria, Negru, and Virag (2020) highlights the challenges teachers face in accessing digital tools, resources, and competencies during the integration of digitization in education. It examines how teachers understand and address these challenges emphasizing the need for enhanced digital competencies. Teachers play a pivotal role in the educational process serving as its cornerstone.

In the modern era, the role of teachers extends beyond traditional teaching methods to encompass guiding learners in acquiring and applying knowledge effectively (Nasr, 2008). Digital learning has further magnified the importance of teachers demanding creative and skilled individuals capable of designing and managing dynamic e-learning environments. Ahmad, Al-Nawaiseh, and Al-Nawaiseh (2023) emphasize that digital teachers must be innovative and proactive, crafting learning spaces that promote self-education and learner independence while integrating relevant, updated content into their practices.

Advocates for electronic discussion groups to enhance teamwork, Grand-Clement, Axelle, Julie, and Catriona (2017) stress the need for technical and human readiness. This includes providing the tools and software required for digital learning and raising cultural and educational awareness among teachers and students.

Moreover, it is a key competency for the 21st century. Zaragoza, Diaz-Gibson, Caparros, and Sole (2019) point to the need for teachers with advanced competencies, psychological readiness, and adaptability to evolving digital demands expanding e-training programs can prepare teachers for the complexities of digital education.

Research also supports the transformative potential of digital education for both teachers and learners. Bdiwi, De Runz, Faiz, and Ali-Cherif (2019) note that digital learning entrusts students with diverse tasks, fostering lifelong learning opportunities when effectively implemented.

Additionally, Gambo and Shakir (2022) argue that digital education improves the quality of learning by creating environments tailored to learners' varying mental levels, ages and stages. Adaptive learning environments as explored in recent studies emphasize the mutual adaptability of teachers and learners to dynamic educational contexts. These environments intelligently adjust based on learners' data and prior knowledge offering personalized experiences that maximize educational outcomes. Teachers can meet diverse learner needs, fostering an interactive and effective digital learning process by leveraging such environments.

The discourse on digital learning outcomes revolves around its primary benefits. Bdiwi et al. (2019) and Gambo and Shakir (2022) argue that digital education enhances overall quality through its adaptability to various learner levels and abilities. This raises the central question i.e., is the foremost benefit of digital learning its promotion of active participation and continuous learning or its ability to deliver customized and high-quality educational experiences?

Grand-Clement et al. (2017) shifted focus to teachers stressing their technical and cultural readiness as prerequisites for effective digital instruction. Similarly, Zaragoza et al. (2019) emphasized the psychological readiness and adaptability required for teachers to navigate digital transformations effectively.

The alignment between studies, such as Bdiwi et al. (2019) and Gambo and Shakir (2022) emphasizes the importance of customizing learning environments to meet individual student needs, thereby enhancing educational quality. The present study diverges from prior research by focusing on the degree to which teachers adapt to digital teaching skills within the framework of sustainable professional development. This study explores the readiness of educators to integrate and sustain digital practices in their teaching environments employing a descriptive survey methodology.

2. Research Methodology

The researcher used the qualitative approach to suit the subject of the current study and its objectives by collecting information and data on the level of teachers' adaptation to the skills of the digital teacher, considering sustainable professional development by conducting interviews and asking open-ended questions based on the nature of the study and the information required to answer its questions and achieve its objectives. The data collected is not in the form of numbers but comes from interviews, field notes, personal documents, memo notes, and other documents. This study uses a descriptive method to compare actual data with the applicable theory.

2.1. Data Collection and Analysis

The most important phase of a study is gathering data. Both primary and secondary sources were employed in data collection for this study. In addition, the researcher's research methodology is qualitative, and the data was gathered through social media, direct communication, and email to reach as many people as possible in a variety of geographic locations allowing access to all educational environments. Additionally, the sample consists of more than 300 male and female teachers and individual interviews were conducted through social media and the Zoom platform which included the study questions as attached to the questionnaire because the community is large. Setting the time for the interview was within the time that suits the target group, so it was very effective and the researcher felt comfortable for the teacher during the interview and answered the questions with confidence and proficiency.

The researcher employs a semi-structured interviewing style in which the researcher conducts interviews using a pre-prepared set of questions that may be expanded upon during the interview. Conversations having a clear goal are called interviews. Two people participated in the conversation: the interviewer, who asked the questions, and the interviewee, who was the one who answered them. Direct face-to-face interaction between the information provider and the information seeker is the primary characteristic of the interview. A variety of prepared questions were asked throughout the interview. Through these interviews, the researcher collects data, information and descriptions of the research subjects. The interview technique in this study was aimed at exploring teachers' degree of adaptation to digital teacher skills considering sustainable professional development.

2.2. Population and Sample

The study population consisted of all teachers of the basic education stage in public schools in the capital Amman /Wadi Al-Seer Brigade for the academic year 2023-2024 which numbered 1371 male and female teachers, distributed between 41 female schools and 19 male schools. According to the latest statistics available at the Directorate of Education for Wadi Al-Sir Brigade, these participants were chosen based on the findings of a field analysis conducted by researchers to assess the teacher's ability to use technology (see Table 1).

Table 1. Distribution of members of the study community in Wadi Al-Seer Brigade in the capital Amman.

Sex	Males	Females	Total
	504	867	1371
Schools	19	41	60

Table 1 shows that the number of female teachers is higher than the number of male teachers. In terms of schools, female schools were also higher than male schools. The study sample consisted of 60 male and female teachers selected by the simple random method. The sample study members were also distributed according to the variables (gender and teaching experience) as shown in Table 2.

Table 2. Distribution of the study sample according to its variables.

Variables	Category	Frequency	Percentage
Sex	Males	107	34.4%
	Females	203	65.5%
	Total	310	100%
Teaching experience	Less than 5 years	65	21.5%
	5 - 10 years	79	25.5%
	10 years and more	166	53.5
	Total	310	100%
Total		310	100%

Table 2 shows that 34.4% of the study sample is male while the percentage of females was 65.5%. In terms of teaching experience, the highest percentage of teachers served was 10 years and more and reached 53.5% and secondly came the teachers who served 5 years – less than 10 years and by 25.5% and finally the teachers who served 5 years and less is 21.0%.

2.3. Interviews

The interviews were used to gather information and to complement the data collected by the interviewers and the information was collected in a direct way from its source. The open interviews were conducted with 100 male and female teachers from the study sample who expressed their desire to do so as the data were recorded to benefit from them in interpreting the results. The interviews were conducted directly and during the researcher's visit to schools.

3. The Findings of the Research

Analysis of study data: Personal characteristics of the study sample: Table 3 shows the distribution of the study sample according to their personal characteristics.

Table 3. Demographic characteristics of the study sample.

	Groups	Frequency	Percentage
Gender	Male	107	34.5
	Female	203	65.5
Teaching experience	Less than 5 years	65	21.0
	5 - 10 years	79	25.5
	10 years and more	166	53.5
Total		310	100.0

3.1. Gender

The percentage of males was 34.5% and the percentage of females was 65.5%. It is noteworthy that the percentage of females is the largest. The researcher explains the increase in the percentage of females due to the increase in the total number of female teachers, which is 867 female teachers compared to the number of male teachers which is 504 male teachers in addition to the increase in the number of female schools and mixed schools in Wadi Al-Sir district in the capital Amman. Therefore, this led to an increase in the percentage of females as shown in the following Table 4.

Table 4. Distribution of members of the study community in Wadi Al-Sir Brigade in the Capital Amman by gender and schools.

Sex	Males	Females	Total
	504	867	1371
Schools	19	41	60

3.2. Teaching Experience

The highest percentage of teachers served was 10 years and more and reached 53.5% and secondly came the teachers who served 5 years – less than 10 years reached 25.5%, and finally the teachers who served 5 years and less reached 21.0%.

4. Data Analysis

Data analysis in research is essentially a process of processing data that has been obtained in the field so that it becomes information. The result of the study besides depending on the data obtained in the field will also depend on how the data are analyzed. The data analysis technique used is descriptive analysis technique through qualitative research using data and information obtained directly from informants and then analyzed using a theoretical basis and described systematically based on the facts from the field. This data analysis is closely related to the research design and problem formulation that have been determined before. It can be stated that data analysis techniques can only be used after research points have been met, for example by collecting the appropriate data that is adapted to the problems in specific research.

Thus, the purpose of the data analysis is to determine or get the overall conclusion that comes from the research data that has been collected by the researcher. In addition, data analysis techniques aim to describe and

explain the research data so that it can be understood. The researcher used the description and analysis of data on what is available in the target group environment to conduct data analysis and draw conclusions.

There is three main focus of discussion from the data obtained from this research, namely (a) How do teachers adapt the skills of a digital teacher considering sustainable professional development? (b)What is the relationship between the teacher's specialization from your point of view and the degree of interaction with digitization in education and its acceptance and adaptation? (c) How does the degree of awareness of parents and the surrounding environment reflect on the teacher's acceptance and adaptation to digital learning and keeping pace with the times and its requirements?

5. Interview Results

As for the analysis of the results of the interviews in the current study, data were collected from teachers through interviewing them personally in their workplaces, and through social media in particular, and to reveal the degree of adaptation and adaptation of teachers to integrate digitization into the educational process which has become an important modern requirement, and this is why the data is classified by answering the questions of the study as follows:

5.1. Question 1: How does the Degree of Teachers' Adaptation to Digital Skills Sustainable Development? Training Programs to Develop Digital Competencies for Teachers

Every willing teacher who is interested in using digital learning tools like the Internet and other super media in the classroom will receive training digitally, according to the teacher development philosophy. The study examined the degree of teachers' adaptation and interaction with these programs, including their use of online programs and platforms for educational purposes by conducting interviews with them and classifying the data. This was done to achieve the fourth sustainable development goal which is to update teacher training programs to develop digital competencies for teachers. 60% of the teachers in the research sample who participated in interviews stated that there is a high level of teacher-to-digitalization adaptation in the classroom. According to the study, it is critical and essential to monitor improvements and stay updated with advancements in other nations (Alsalti, Bani, & AlRaggad, 2024).

The ministry is working with interest to develop the teacher digitally although there are training courses continuously for teachers as a number of them reported, the benefit of these programs is not in the required form, and the reason is that teachers are not available to join these courses and that they were held during school hours, and the difficulty of transportation and mobility led to a reduction in participation despite the fact that they expressed their desire to do so because the activation of digital learning tools has benefits for educational work and learners.

40% of teachers needed their circumstances to enroll in training courses that enabled them to possess digital learning skills online and they were following the courses using digital platforms such as Zoom and Microsoft Teams but they benefited little because of the difficulty of direct application, and they also reported that the evaluation was self-assessed. Taking advantage of the training process in all its aspects without moving to the training place and without the presence of the trainer and trainees in the same space does not achieve the important and important interaction in the training, which is a three-dimensional interaction (digital training content, the trainer, and the trainees) and managing the training process as soon and less expensive.

Through the interviews, it was also discovered that the training programs offered by the government do not include the abilities required to be a digital teacher. The low efficacy and quality of these initiatives are among the deficiencies. According to the interviews, 90% of the teachers agreed that the lack of training program viability which prevents teachers from presenting the curriculum in ways that grab students' attention, creating assessments and using the tools to provide instant feedback, and creating all design-related activities is what led to the low activation of digital learning in the educational process, not a lack of motivation for training. They also stressed that this places a great responsibility on the teacher to be aware of everything new in the field of educational technologies.

Some teachers considered that adapting to digital and online teaching and learning is one of the most important skills that a digital teacher should master in the 21st century. They considered the need to acquire new digital competencies as part of the process of adapting to the digital age. One teacher said, "I think anything can be learnt if the teacher is provided with the appropriate opportunity to participate and learn to integrate digitalization with education. Then it can be easier to adapt and accept digitization than if we can't use it."

"I have been an Arabic teacher for 15 years. We have not participated in the training courses required for the digital teacher. However, I am embarrassed in front of the students if they ask me to activate the websites or provide them with something through the websites for digital content." Do you find learning computer skills and digitization any difficulty?" The teacher replied, "I think he needs to know the minimum to be able to use the computer and I don't think using it is very complicated. Anyone and any teacher can learn if they want to. I consider that communication competencies in the online environment are particularly necessary [nowadays]. One teacher linked the challenges of developing the digital competencies needed for online teaching to the lack of skills in other areas, for example, English language skills. It is a necessity to provide an opportunity to develop digital competencies as evidenced from another teacher interview in which he says.

"I think core digital competencies are essential to be able to teach online. You can see how easy it is to talk now in an online environment. But if you had asked me three months ago or more, I wouldn't have known which button to press. Instead of turning the camera on, I would turn it off, and so on. Because I don't know English, I needed to pick up words like Get going! Anyone can "play", "access", "share" [originally English word], maybe there are competencies that I have not discovered, but they are enough for me.

5.2. Question 2: What is the Relationship between the Teacher's Specialization from Your Point of View and the Degree of Interaction with Digitization in Education and its Acceptance and Adaptation?

According to the results of the interview, 30% of teachers have no trouble adjusting to digital learning and its resources, such as the Google educational app, creating instructional and interactive videos from a technical standpoint, communicating with and engaging students in digital learning. The nature of their computing and scientific fields is the cause. However, some teachers stated that even though they readily adjust and actively engage with digital learning resources, there are challenges in putting them into practice because there aren't enough suitable environments, particularly in remote areas where some schools still lack computer labs and the Internet is unavailable for various geographical reasons.

Some of the teachers (50%) confirmed they work in schools where there is infrastructure to a certain extent and to a medium degree which allowed them to communicate through websites and activate digital platforms, and take electronic tests, and the communication was good, fast, interactive and positive from the students, as they indicated that the students felt independent in expression, providing suggestions and answers as well as participating in the discussion.

5.3 Question 3: How Does the Degree of Awareness of Parents and the Surrounding Environment Reflect on the Teacher's Acceptance and Adaptation to Digital Learning and Keeping Pace with the Times and its Requirements?

Some teachers reported that the degree of their compatibility and harmony with the integration of digitization in education is to the degree of awareness of some parents as 70% of parents are supportive and supportive of interaction between students and communicating with them on an ongoing basis, which increases the degree of students' interest and makes it easier for parents to follow up with their children and monitor their academic achievement, especially since many parents have jobs and return home late.

A group of teachers stated that we could not adapt and interact with students in the educational process through digital learning tools especially if there are some classes that are given remotely to strengthen students, but among 70% of teachers, we cannot judge that the student is with us during the lesson, especially since the student locks the camera, and more than once I ask students to turn off the sound next to him.

The lack of updating teachers' communication programs was an important reason for describing the technical problems that are occurring that hinder the progress of the class, including what was mentioned by a young teacher (twenty-five years old) as follows:

“I have a phone to work from but the camera is not very good. Since I'm working from my phone, I can't see them all at once. I only work on my phone; I don’t work from my laptop.

Another teacher spoke about digital pedagogy as a difficult field to understand and complained about the differences between face-to-face and digital communication.

Teachers have become concerned about whether parents and students can master the digital resources needed for the educational process and the competence these resources require: “It was a challenge to learn how to work online at the beginning of my educational career, to learn many things on [online educational] platforms,” says one teacher.

How is communication achieved between your teacher, parents and students, and by what means? “It was difficult to communicate with parents,” says one teacher. I was afraid at first that they wouldn't understand a lot of things. The WhatsApp group and getting all the kids phone numbers I didn't have, the Google Classroom platform, set up all the accounts, and then worked on Zoom and so on. I was surprised at how fast and resilient the parents were.”

Communities that invest in digital infrastructure (high-speed internet, devices, etc.) make it easier for teachers to implement digital learning strategies.

Lack of Resources: In less aware communities with limited resources, teachers might struggle to adopt digital tools due to lack of access and support, hindering their ability to keep up with modern educational requirements. In essence, a well-informed and supportive environment fosters a teacher’s confidence in adopting digital learning, while a lack of awareness or resistance from parents and the community can slow down this transition.

6. Digital Infrastructure

Although it is important to provide a strong digital infrastructure for education, to achieve efficiency and continuity in education, some schools suffer from a severe lack of technological infrastructure, as well as a lack of human infrastructure.

“How do you find the strength of the Internet network in the school and the residential area in general?

During an interview with some teachers, 70% of them reported that the broadband infrastructure is completely centralized, as they showed through their experience in education and their direct communication among them that schools in the governorates, villages, camps and valleys suffer the most from the provision of the Internet, and the unequal opportunities between the governorates and the few high-speed Internet subscribers. This was an obstacle in the adaptation of teachers to integrate technology into education, as well as reflected on students as the great weakness generates boredom and monotony among students in following up their learning which drives them to leave the websites of the proposed educational materials, as well as reduces the speed of their interaction in submitting assignments. 60% of teachers confirmed that the technological infrastructure was of below average quality, and the question was asked "What technological tools are available in the school?" 40% of teachers confirmed that the touch devices we rely on are our devices and they are not available in school such as phones, laptops and the question was “Is it possible to connect to the Internet through them?" 50% of teachers said that the telecommunications infrastructure has poor access to the Internet, electricity, etc. We have difficulties in ensuring that all students can attend appropriate classes and solve assignments due to problems with technological infrastructure. This was understood to be happening because the students' families did not have the means to provide them with access to technology during the day while working.

Teachers teaching students with access to a laptop and the Internet considered themselves lucky, pointing to the fact that they considered this to be the exception rather than the rule. In some cases, how do you find the

follow-up mechanism for students characterized by difficulty and enjoyment of distance learning while following assignments?

One teacher reported that even half of the class, some students were not able to follow online learning activities on a regular basis. Another of the interviewees stated that the difficulty of adapting and accepting digital learning, as well as I was unable to follow the performance of my students through the platforms due to the low quality of the Internet, the high cost of subscription to this service, that I have a phone that does not support the Internet service. One says having a mobile device is twice the income they earn. However, they felt that the lack of participation was linked to poverty.

Another teacher mentioned a lack of intrinsic motivation also noting that a lack of commitment to attending online classes may have an impact on some students' willingness to attend. This applies to some of the teachers interviewed. There was communication only through WhatsApp.

6.1. How is Communication through the Platforms through Your Interaction with Students, and How Does this Reflect on the Communication between Students and Teachers?

Other teachers even mentioned that communication and follow-up through educational platforms require less technological infrastructure as a strategy to reach a larger number of students as this teacher who works in a rural area, mentioned during the focus group.

'Yes, there are some students we couldn't contact via Zoom but we did it via messenger, we keep messages, sometimes we work on Zoom and messenger, we work from the laptop but also from the phone, and that's how we tried to reach as many students as possible.'

Moreover, even when online communication between students and teachers is possible, technological infrastructure has negatively affected the communication process, affecting how well the teacher understands what is going on, on the other side of the students' screens. Communication through educational platforms plays a crucial role in shaping the interaction between students and teachers. Platforms such as learning management systems (LMS), video conferencing tools, and collaborative software have transformed the way education is delivered and how communication takes place. Here's how this dynamic works and how it reflects the communication between students and teachers:

Communication through educational platforms plays a crucial role in shaping the interaction between students and teachers. Platforms such as learning management systems (LMS), video conferencing tools, and collaborative software have transformed the way education is delivered and how communication takes place. Here's how this dynamic works and how it reflects communication between students and teachers, enhanced accessibility and flexibility.

Communication through platforms makes education more accessible. Teachers can provide resources, lectures, assignments and feedback from anywhere allowing students to learn at their own pace. Real time and asynchronous communication teacher- student interaction platforms enable both real-time communication (e.g., live classes, chat features) and asynchronous communication (e.g., discussion boards, recorded lectures). This balance allows for immediate feedback and ongoing dialogue.

Collaborative platforms, such as Google Classroom, Microsoft Teams, or Moodle, allow for group work, peer reviews, and shared resources. Teachers can assign collaborative tasks that encourage students to work together. This collaborative approach helps build a stronger sense of community even in remote or hybrid learning environments, enhancing both teacher-student and student-student relationships.

Teachers can provide continuous feedback on assignments and participation, and students can communicate their difficulties or ask questions directly on the platform. Platforms can lower the psychological barriers that might exist in traditional classrooms, such as shyness or fear of speaking out. Students may feel more comfortable asking questions through chat or discussion boards than in-person.

7. Discussion

The researcher found that in-service teacher training programs should be more modern and developed, and in line with the requirements of the digital age and to meet the needs of digital transformation in the educational process in light of the presentation and interpretation of the results. This is what he confirmed (Zeitoun, 2007) especially that learners have the ability to seek, analyze and research more than previous generations and we must not remain the same approach and usual educational policies. Adaptation to digital and online education and learning has become one of the most important skills that a digital teacher should master in the 21st century.

This requires gaining modern skills that have been addressed by the sustainable development of education as well as working to provide the appropriate educational environment and enrich the infrastructure with modern digital technologies and working to conclude agreements and partnerships with local and international community institutions to support the educational field with the necessary digital technologies and technology and to provide human resources that have the ability to qualify the current teacher digitally (Ahmad, Qawaqneh, Zraiqat, & Jamil Al Nawaiseh, 2023). He lacks the necessary skills in digitization and he did not receive his learning during the university stage that he studied in the past. According to Ahmad (2024) digital communication between all elements of the educational process and the local community must be established to ensure the success of the educational process and to create a safe environment.

Building teachers' digital abilities is essential to promote sustainable professional development since it helps them stay updated with the quick changes in technology and contemporary teaching techniques. Teachers must also be knowledgeable about the latest developments in educational robots and technology since the future of education hinges on developing tools that are easy to use and suitable for accelerating the learning process for students in line with the study's recommendations (Al-Nawaiseh, Tabieh, Maqableh, Altawalbeh, & Ahmad, 2024).

The value of enhancing teachers' digital abilities is clear when it comes to raising educational standards and utilizing technology to assist teachers in creating engaging and creative learning environments that better serve students' varied needs. Digital skills may boost productivity and efficiency and pave the way for teachers to take advantage of e-learning resources like online training classes which allow them to keep improving their abilities without depending on more conventional training options.

Enhancing interaction with students because technology provides new ways to interact with students such as virtual classrooms and e-learning platforms and enables them to keep pace with technological development through the ability to employ modern tools and technologies in education which enhances their efficiency and makes them able to deal with future challenges.

8. Recommendation and Contribution

The current findings of the study allow outlining several recommendations that are likely to improve digital teaching skills. Implications and limitations:

8.1. Implications

- It is recommended that educational institutions come up with strategic plans and programs that utilize the positive attitude of the teachers towards digital learning so that the focus on improvement is never-ending.
- It becomes necessary to deliver additional training programs to enhance teacher effectiveness and ease their adjustment to the digital learning environment.
- Initiatives aimed at the introduction of e-culture could increase students' interests so that they are prepared for active involvement in online learning.
- There should be an incorporation of digital learning courses in the teacher preparation programs in the universities which will help to broaden the skills of the prospective teachers and thus ensure that the new teachers possess the relevant skills as soon as they graduate.

8.2. Limitations

This study adds to the existing body of knowledge by emphasizing the need for the sustainable professional development of teachers to attain progressive levels of digital skills enhancement in teaching. The study makes clear the gaps in teachers' digitalization at their level and therefore calls for the provision of systems that harmonize the delivery of resources to be both digital and human to enhance the practice. This study adds to the general knowledge of the last few decades which were focused on how any country can effectively advance its digitalization in the education sector through informing policies and structures of teacher education programs. The work is a contribution to the advancement of knowledge in the areas of sustainable professional development in relation to strategic areas and shows a direction in which education stakeholders can adopt to enhance digital competencies among teaching faculties.

9. Conclusion

Conducting such a study on a different sample of public school teachers and comparing the results of this study to obtain a clearer picture of the degree to which teachers possess digital learning skills. We present the proposed vision for developing professional development programs for teachers considering the requirements of the Fourth Industrial Revolution, including its starting points, components, stages and mechanisms for its implementation, obstacles to its implementation, how to overcome them, and indicators of its success.

In conclusion, it can be said that if the proposed vision can be implemented, it will contribute significantly to enriching the educational process, increasing its effectiveness, and keeping pace with the Fourth Industrial Revolution by raising the cognitive and skill levels of an important element of the educational process inputs, namely the teacher.

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