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# Teaching/Learning Assessment/Evaluation in Technology-Supported Environments

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Technology Integration (TI), Pedagogical Strategies (PS), Formative Assessment Methods (FAM), Student Engagement (SE), Teacher Experience (TE), Learning Outcomes (LO) and Student Satisfaction (SS).

**ABSTRACT**

The primary aim of this study is to investigate the intricate dynamics between teaching, learning assessment, and evaluation within technology-enhanced environments within higher education institutions in Saudi Arabia. The study aims to test different ideas about how technology integration (TI), pedagogical strategies (PS), formative assessment methods (FAM), student engagement (SE), teacher experience (TE), and the results of learning (LO) and student satisfaction (SS) are related to each other. The data employed in this study was collected from a heterogeneous sample of educators and students encompassing both public and private universities in Saudi Arabia. The research employed a fundamental random sampling approach, employing survey questionnaires as the primary instrument for data gathering. Two sets of questionnaires were distributed, with the first questionnaire focusing on the subjects of "integrated technology" and "teacher course experience." This particular survey was specifically designed for teachers and instructors. In contrast, the second survey consisted of questions related to pedagogical strategies, assessment techniques, student involvement, student contentment, and educational achievements. This survey was administered to the student population. Both students and teachers were given their own set of 300 questionnaires to fill out. The response rate was 92.7% for students, with 278 completed questionnaires returned, and 61.3% for instructors, with 184 completed questionnaires returned. The analysis of the data was conducted using SPSS version 20. Descriptive statistics and regression analysis were employed to examine the relationships between the variables. The findings of this research provide valuable insights into the intricate correlation between the incorporation of technology, instructional methods, formative evaluation methods, student involvement, teacher proficiency, and their influence on academic achievements and student contentment in educational environments that employ technology. The aforementioned insights possess the capacity to influence educational policies and practices, not solely within the confines of Saudi Arabia but also in various other settings. This influence can aid in the successful implementation of teaching and learning strategies that are effective, particularly within the context of digital advancements.



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## Introduction

Current students demonstrate a significant preference for technology, which requires the investigation of innovative approaches that effectively utilise technological capabilities to improve the educational process. The application of information and communication technology (ICT) tools possesses the capacity to induce a substantial metamorphosis within the realm of academia. The implementation of this dynamic instructional approach offers numerous advantages when compared to the conventional use of blackboards and chalk. The educational experience for students may at times exhibit repetitiveness; however, in the contemporary era of digital technology, it is crucial to integrate information and communication technology (ICT) within the classroom environment. The integration of various components is of utmost importance as it provides students with significant opportunities to acquire and apply essential skills that are imperative for achieving success in the modern era. Therefore, conducting a thorough examination of the issues and intricacies associated with the utilisation of information and communication technology (ICT) in educational environments can empower educators to overcome obstacles and cultivate proficiency in leveraging technology proficiently.

The rapid advancement of computer technology has enabled the creation of a diverse range of resources that are tailored to meet the needs of specific academic disciplines. The integration of technology has emerged as a fundamental element of modern society, given the pervasive presence of electronic devices in our daily routines. The pervasive influence of information and communication technologies (ICT) is readily apparent, as they have infiltrated various domains, including commerce, transportation, and education. These technologies encompass a wide array of tools, such as blogs, social media platforms, and online pages. In the realm of education, the predominant approaches to organised instruction currently consist of the traditional classroom model, technology-facilitated teaching, and blended learning, which combines both in-person and virtual pedagogical methods (Kaur, 2023).

The collective findings of the papers indicate that the utilisation of technology-supported environments yields favourable outcomes in the realms of teaching, learning, and assessment. According to Tusiime and Wambi's (2023) research, teacher educators in Uganda encountered difficulties when attempting to incorporate technology-enhanced learning into their teaching practices. These challenges were primarily attributed to a dearth of information and communication technology (ICT) skills among educators, as well as an unreliable power supply. Venkataraman and Andal (2021) conducted a comprehensive review of studies that examined the impact of technology-supported education on student learning outcomes. The findings of this review indicate that the integration of technology in education has been associated with various positive outcomes, including enhanced levels of learning, improved attitudes towards learning, increased engagement among students, and enhanced performance on assessments. The significance of artificial intelligence in revolutionising education and fostering digital skills was examined in the Flogie & Krabonja's (2023) study.

Meanwhile, the Sarıgoz's (2023) study investigated educators' perspectives on web-based e-assessment and evaluation tools, emphasising the benefits of flexibility and convenience alongside the obstacles associated with technical difficulties and their

applicability to diverse courses. In general, the aforementioned papers underscore the capacity of technology-supported environments to enhance pedagogical, educational, and evaluative methodologies. According to Sitthiworachart et al.'s (2022) study, having a teaching environment that is technologically advanced can be very helpful in fostering teacher professional development and promoting the incorporation of technology into upcoming instructional strategies. In the work by De Corte, Smelser, and Baltes (2001), the author examines the transition from conventional classroom settings to technologically enhanced learning environments that foster active, constructive, and collaborative forms of learning. The study conducted by Kumari, Goswami, & Gupta's (2015) investigates the favourable attitudes of students towards learning environments in teacher education classrooms that are supported by technology.

Nevertheless, according to Eckhaus and Davidovitch (2019), there is a notable constraint on the utilisation of technological tools by faculty members in their teaching practices, as they are frequently perceived merely as technical aids rather than pedagogical tools. In brief, technology-enhanced environments present prospects for inventive pedagogy and favourable learning encounters; nevertheless, there exist obstacles to the complete assimilation of technology into instructional methodologies. According to Venkataraman and Andal (2021), there is evidence to suggest that the integration of technology in education yields favourable effects on student learning outcomes. The use of this approach has been found to enhance various aspects of the educational process, including learning outcomes, attitudes towards learning, levels of engagement, motivation, and performance on assessments. Nevertheless, the implementation of technology-enhanced learning is accompanied by various challenges. These challenges encompass insufficient information and communication technology (ICT) skills among educators, restricted availability of devices for learners, and the complexities associated with effectively integrating content and pedagogy (Tusiime & Wambi, 2023).

Artificial intelligence (AI) is widely recognised as a valuable instrument for revolutionising the field of education and fostering the growth of digital competencies. However, in order to effectively evaluate the suitability and efficacy of AI, educators must possess the requisite knowledge and access to appropriate tools (Flogie & Krabonja, 2023). In addition, there exists a range of scales that can be utilised for the evaluation of learning environments, among which the "What Is Happening in This Class?" instrument holds prominence as the most frequently referenced and employed measure (Santiago & Silva, 2023).

## Literature Review and Hypotheses

Previous studies have indicated that technology-enhanced environments have a significantly beneficial effect on the domains of teaching, learning, assessment, and evaluation. According to the study conducted by Venkataraman and Andal (2021), it was determined that the utilisation of technology in education resulted in enhanced learning outcomes, improved attitudes towards the learning process, heightened levels of engagement and motivation, as well as superior performance on assessments. Laborda et al. (2015) emphasises the benefits of incorporating technology into the assessment process, with a specific focus on formative assessment. The utilisation of technology enables increased flexibility and accessibility, thereby enhancing the overall effectiveness of the assessment methods. The study conducted by Kumari, Goswami, and Gupta (2015) centres

on the utilisation of technology in teacher education classrooms. The findings of the study indicate that students have a positive perception of their learning environment. In the study conducted by Živković (2016), the author examines the incorporation of technology within the English for Specific Purposes (ESP) learning setting and reveals that students exhibit favourable dispositions towards its integration. In general, the aforementioned papers present empirical evidence that supports the notion of technology-supported environments having a significantly positive influence on various aspects of education, including teaching, learning, assessment, and evaluation.

Previous studies have yielded varying results regarding the potentially detrimental effects of technology-supported environments on the assessment and evaluation of teaching and learning. The Santos, Spanhol, & Marcelino's (2022) report emphasises the favourable effects of digital technologies on education, including enhanced instructional approaches and the integration of digital native learners. However, the report also acknowledges the existence of physical and operational obstacles that hinder the successful implementation of these technologies. In the study conducted by Kocoglu (2021), an evaluation was made regarding the impact of digital learning environments on the process of learning and teaching. The study highlights the presence of both favourable advancements and adverse consequences in this regard. Pinto and Lourdusamy (2021) examines the disparities and obstacles encountered in the successful transmission of knowledge via online instruction, encompassing deficiencies in teacher training and resources as well as difficulties arising from social contexts and domestic settings.

The study conducted by Kumari, Goswami, and Gupta (2015) examines the perceptions of students regarding technology-supported learning environments in teacher education classroom. The findings indicate that, on the whole, students hold a positive perception of these environments. Nevertheless, the aforementioned papers do not specifically address the adverse effects of technology-supported environments on the assessment and evaluation of teaching and learning.

Previous studies have indicated that the integration of technology into educational settings has a beneficial impact on learning outcomes. According to Wekerle, Daumiller, & Kollar's (2022) research, there is a positive correlation between student participation in constructive, interactive, and active activities made possible by technology and the achievement of learning outcomes in the context of higher education. As reported by Jaiswal (2020), the utilisation of educational technologies in higher education was associated with a favourable influence on students' academic accomplishments. Bergdahl et al. (2020) provided additional evidence to support the idea that students who perform at a high level demonstrate greater engagement and concentration when utilising educational technologies, in contrast to their peers who achieve average or lower levels of performance.

Furthermore, the meta-analysis conducted by Lee et al. (2020) demonstrated that the incorporation of technology into literacy instruction yielded favourable outcomes in terms of literacy development among English language learners in grades –12. The collective findings of this study indicate that the integration of technology within educational environments has the potential to enhance learning outcomes. The research presents varying results regarding the correlation between the integration of technology and student satisfaction. According to a study by Pandita and Kiran (2023), the technology

interface had a positive effect on student engagement, which raised student satisfaction. Bloom and Hough (2003) conducted studies that revealed a significant level of student satisfaction with technology-enhanced learning. It was observed that faculty expertise played a crucial role in this regard. In the context of Routabi and Bennani (2022), a particular emphasis was placed on the pedagogical incorporation of NICTs (New Information and Communication Technologies) amidst the COVID-19 pandemic. The study revealed that the presence of the teacher and the calibre of the technological infrastructure emerged as the primary determinants influencing student satisfaction.

In line with scholarly research, the implementation of innovative pedagogical strategies has been found to have a positive influence on learning outcomes. In a 2017 study, Babu (2017) found that adding a self-study component to the course delivery structure improved students' cognitive abilities and skills. In her study, Popkova (2020) underscored the educational value of assessment in enhancing learner achievements, emphasising the significance of equitable and captivating assessment methodologies. In a 2014 investigation, Vila, Hurtado, and Silvente (2014) looked into the effectiveness of digital portfolio assessment and project-oriented learning as formative research strategies. The findings of the study indicated that these strategies had a beneficial impact on the enhancement of higher-order thinking skills. The evaluation of innovative pedagogies in teacher education courses and practica, as discussed by Shambaugh and Brownfiel (2020), establishes a connection between these pedagogies and teacher effectiveness, ultimately leading to improvements in public schools. In general, the aforementioned papers provide evidence in favour of the notion that the implementation of innovative pedagogical strategies can yield favourable effects on educational achievements.

Based on previous research indicates that the implementation of innovative pedagogical strategies is associated with a favourable influence on student satisfaction. In her study, Hilda (2018) observed a notable impact of pedagogical competence on the level of satisfaction experienced by students. In a study conducted by Pedro, Mendes, and Lourenço (2018), it was determined that the perception of service quality in higher education, which can be influenced by various teaching methods, exhibits a positive correlation with student satisfaction. The significance of relational pedagogy in enhancing student satisfaction was underscored by Bell (2021), who emphasised the value of fostering warm and respectful interactions between staff and students. In a study conducted by Santos, Spanhol, and Marcelino (2022), the author examined the impact of innovative pedagogical practices on student involvement, critical thinking, and satisfaction levels. The study specifically focused on student-centred approaches and the integration of technology in the classroom. The findings revealed that these practices were effective in promoting student engagement and enhancing critical thinking skills, ultimately leading to higher levels of satisfaction among students.

While past studies have yielded varying results regarding the impact of formative assessment methods (FAM) in technology-supported learning on learning outcomes (LO). According to Liu and Zhang (2022), the use of formative assessment within the context of online learning has the potential to improve learning outcomes and aid teachers in their instructional planning. However, the efficacy of this approach is contingent upon various factors, including emotional engagement, adaptability, the objective environment, and the technological tools employed. Pishchukhina and Allen (2021) advocates for the utilisation

of online formative assessment and automated feedback in the context of large classes, as it has been found to foster favourable levels of student engagement and facilitate the attainment of desired learning outcomes. However, it has been noted by See et al. (2022) that the available evidence regarding the efficacy of technology-supported formative assessment is lacking, displaying limited effectiveness in enhancing learning outcomes, particularly for older students and subjects that extend beyond mathematics and reading. The study conducted by Irving (2020) underscores the efficacy of technology-assisted formative assessment as a means to enhance classroom communication and provide valuable support to educators in the modern era. In general, there are indications that the use of FAM (feedback, assessment, and monitoring) in technology-supported learning can have a positive impact on learning outcomes. However, in order to establish its effectiveness in various contexts and subjects, further rigorous research is required.

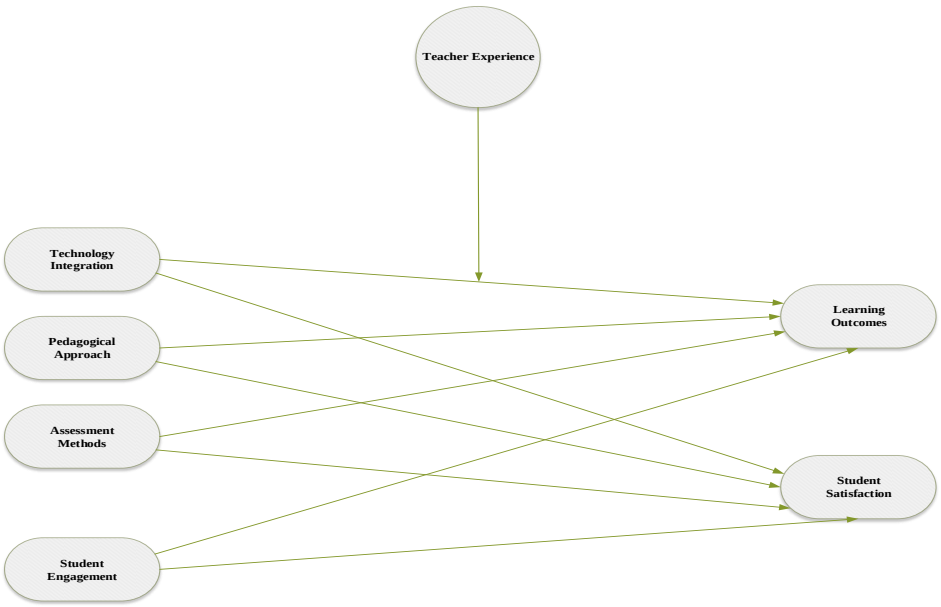
The study by researchers provides useful information about the levels of student satisfaction with formative assessment methods (FAM) in various educational settings. The research study conducted by Diquito et al.'s (2023) investigates the level of student satisfaction pertaining to formative assessment tools utilised in online-blended learning environments amidst the COVID-19 pandemic. This study examines various factors that have an impact on student satisfaction, including feedback mechanisms, satisfaction levels, the availability of the internet and technology, and the overall challenges faced by students. Similarly, Denis and Ţîru (2022) examines the level of student satisfaction pertaining to the online instructional approach. The findings of the study indicate that female participants exhibit a higher degree of contentment with online teaching methods. Another study conducted by GarİPaĞAoĞLu (2022) focuses on the evaluation of student satisfaction within the context of Turkish higher education. As part of this research, a student satisfaction index (SSI) was developed. The research emphasises the significance of perceived utility/benefit and interactional/process-based quality attributes in impacting student satisfaction. Previous research has indicated that there is a positive correlation between increased levels of student engagement and improved learning outcomes.

In a meta-analysis conducted by Li (2023), it was determined that various factors, including positive teacher behaviour and the quality of the teacher-student relationship, exerted a positive influence on student engagement. Consequently, this enhanced student participation in the learning process. The study conducted by Yahya, Hassan, and Sadat (2023) revealed a significant correlation between student engagement and self-regulation in relation to learning outcomes. Notably, student engagement exhibited a stronger association with learning outcomes compared to self-regulation. Khan, Gul, and Zeb (2023) discovered a significant positive association between students' cognitive engagement and their academic achievements and productivity. In a study conducted by Gupta and Hooda (2023), the researcher examined the effects of online education on student engagement amidst the COVID-19 pandemic. The findings indicated that various factors, including interactions between students and interactions between faculty and students, had a notable influence on student engagement levels. Consequently, heightened student engagement was associated with perceived improvements in student learning outcomes and overall satisfaction. In essence, the aforementioned papers present empirical support for the assertion that increased levels of student engagement exhibit a positive correlation with academic achievements.

### *Teacher Experience (TE) Moderates the Relationship between Technology Integration (TI) and Learning Outcomes (LO):*

The papers collectively propose that there is a moderating effect of teacher experience (TE) on the relationship between technology integration (TI) and learning outcomes (LO). A study conducted in 2023 revealed that the integration of technology in educational settings resulted in enhanced academic achievement, thus suggesting a favourable correlation between technological implementation (TI) and learning outcomes (LO). In a study conducted by Fatin Nadirah Aqilah and Nurazidawati Mohamad (2023), it was observed that the level of digital literacy knowledge possessed by STEM teachers had an impact on the integration of technology in their teaching practices. This finding suggests that teacher efficacy plays a significant role in moderating the association between technology integration and learning outcomes. Gyau and Semarco (2023) conducted a study that revealed that students' perceptions play a significant role in the process of integrating technology.

This suggests that technology education (TE) can influence how technology integration is perceived, ultimately impacting learning outcomes (LO). In a study conducted by Sofwan, Habibi, and Yaakob (2023), it was found that the presence of technological pedagogical and content knowledge (TPACK) had a positive impact on the integration of technology during teaching practicum. This suggests that the use of technological expertise may strengthen the connection between technology integration and learning outcomes. In summary, the aforementioned papers collectively propose that technology integration (TI) and learning outcomes (LO) are influenced by the moderating role of teacher expertise (TE). TE is found to impact various factors, including academic performance, digital literacy, perception, and technological pedagogical content knowledge (TPACK).



### *Independent Variables (IVs)*

1. **Technology Integration:** This instrument evaluates the extent to which technology is incorporated into the educational setting. The factors that may be considered include the accessibility of technology resources, the level of teacher training in technology utilisation, and the implementation of teaching methods that incorporate technology enhancements.
2. **Student Engagement:** The independent variable in this study quantifies the extent to which students are actively involved with learning materials that are supported by technology. The variables encompassed in this study consist of student motivation, interest in the subject matter, and the frequency of technology utilisation for educational purposes.
3. **Pedagogical Approaches:** This study investigates various pedagogical strategies employed in technology-enhanced learning environments. The incorporation of variables such as project-based learning, flipped classrooms, and collaborative learning can be observed.
4. **Assessment Methods:** This investigation examines the evaluation techniques utilised in technology-enhanced learning, encompassing formative and summative assessments, self-assessment, peer assessment, and teacher feedback.

### *Dependent Variables (DVs)*

1. **Learning Outcomes:** This dependent variable assesses the educational achievements of students in technology-enhanced learning environments. The concept of "it" refers to a broad range of educational outcomes, including academic accomplishments, the acquisition of knowledge, the development of skills, and the cultivation of critical thinking abilities.
2. **Student Satisfaction:** The present study aims to evaluate the extent to which students are satisfied with technology-supported learning. The variables encompassed in this study pertain to the factors of usability, accessibility, and overall satisfaction in relation to the learning experience.

### *Moderator*

**Teacher Experience:** This moderator variable investigates the extent to which teacher experience influences the relationship between technology integration and learning outcomes. This study examines the potential for experienced educators to enhance their utilisation of technology in a more efficient manner.

### *Hypotheses*

1. **Technology Integration Hypothesis:**
   - H1a: Higher levels of technology integration (TI) positively improved learning outcomes (LO).
   - H1b: Increased technology integration (TI) results in higher levels of student satisfaction (SS).
2. **Pedagogical Strategies Hypothesis:**
   - H2a: The use of innovative pedagogical strategies (PS) positively impacts learning outcomes (LO).
   - H2b: Innovative pedagogical strategies (PS) lead to higher student satisfaction (SS).

3. **Assessment Methods Hypothesis:**
   - H3a: Formative assessment methods (FAM) in technology-supported learning positively influence learning outcomes (LO).
   - H3b: The use of formative assessment methods (FAM) results in higher student satisfaction (SS).
4. **Student Engagement Hypothesis:**
   - H4: Higher levels of student engagement (SE) positively associated with learning outcomes (LO).
5. **Moderation Hypothesis:**
   - H5: Teacher experience (TE) moderates the relationship between technology integration (TI) and learning outcomes (LO).

| Measurement Factors | References |
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| **Technology Integration** | |
| "Integrating technology makes it easier for me to do my instruction. | |
| Integrating technology improves my instructional performance. | |
| Integrating technology gives me greater control over my instructional performance. | |
| Integrating technology is completely compatible with all aspects of my academic work. | |
| Integrating technology is completely compatible with my current situation. | |
| I think that integrating technology fits well with the way I like to teach. | |
| Integrating technology fits into my teaching style. | |
| I believe that technology is difficult to integrate. | Ashrafzadeh and Sayadian (2015) |
| Integrating technology is often frustrating. | |
| I believe that technology is easy for me. | |
| I have had a great deal of opportunity to try various technology applications. | |
| I know where I can go to satisfactorily try out various uses of technology." | |
| "Before deciding whether to integrate technology applications. I was able to properly try them out. | |
| I was allowed to integrate technology on a trial basis long enough to see what it can do for instruction. | |
| I would have no difficulty telling others about results of integrating technology. | |
| The results of integrating technology are apparent to me. | |
| I have seen what others do when integrating technology in their teaching. | |
| It is easy for me to observe others using technology in my university." | |
| **Student Engagement** | |
| "I provide honest feedback when I evaluate my classmates' presentation. | |
| I am fair and objective face-to-face feedback to my colleagues." | |
| "I am comfortable providing face-to-face feedback to my colleagues. | |
| I work harder to attend all meetings than I will have when my peers grade me. | |
| I think that the comments and evaluations given are useful for making improvements. | Manalu (2016) |
| I enjoy the presentation as an evaluator. | |
| I enjoy the presentation as an evaluate. | |
| Peer evaluations provide information on things that the lecturer does not see. | |
| My peers can provide me with useful feedback on my performance. | |
| It improves communication, when we grade each other-ex: everyone's opinion is heard. | |

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| Peer evaluation is important for my English skills development.<br>Adding peer evaluation to the English for academic purposes course has improves the evaluation system." | |
| **Pedagogical Approaches** | |
| "Teachers know how to apply teaching modules on the Web into courses.<br>Teachers are able to use Web technology to enhance teaching.<br>Teachers are able to use the Web to enhance students' learning motivation."<br>"Teachers are able to select proper existing Web-based courses to assist teaching.<br>Teachers are able to apply Web technology to use multiple teaching strategies on a particular course unit.<br>Teachers are able to guide students to use Web resources to study a certain course unit.<br>Teachers are able to use Web resources to guide students' learning activities for a certain course unit.<br>Teachers are able to use Web resources to guide students' learning activities for a certain course unit.<br>Teachers are able to use Web technology to support teaching for the content of a particular course unit." | Lee and Tsai (2010) |
| **Assessment Methods (Formative assessment)** | |
| "I think I am good at school.<br>"I am sure that I can understand the things taught in my class.<br>I think that I am better in school than some of my classmates.<br>I do my homework even when it is boring.<br>When the teacher is talking, I think of other things and do not listen to what she is saying.<br>I always come to school with my homework completed.<br>In class I am always attentive." | Bertolani, Mortari, and Carey (2014) |
| **Learning Outcomes** | |
| "The teacher used the practical and experimental methods in groups in learning physics<br>The teacher stated that in group learning students are asked to discuss solving a problem<br>The teacher stated that there was a set time limit for students to discuss<br>The teacher stated that students found it difficult to contribute to giving ideas in groups<br>The teacher stated that students had difficulty managing time in group discussions<br>The teacher stated that students found it difficult to find answers to problems<br>The teacher stated that students had difficulty hearing opinions and helped group members"<br>"The teacher often raises questions at the application level in the assessment instrument<br>Teachers did online learning through videos and pictures accompanied by literacy assignments<br>The teacher conducted online learning by providing modules containing teaching material, sample questions, and practice questions that are sent via the WhatsApp group<br>The teacher conducted online learning through the WhatsApp group, where students were given a stimulus in the form of a picture or ppt about the material, then the students were asked to work on an assignment in the form of a description item<br>The teacher did online learning by giving assignments that must be done in groups by students via the WhatsApp group<br>The teacher stated that during Online learning, students were not disciplined in collecting" "assignments and did not attend the Physics learning schedule<br>The teacher stated that during online learning the group learning technique was carried out by students working on the question link by including evidence of a joint video call and a screen shoot chat of students when discussing problem-solving | Purnamasari et al. (2021) |

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| stated that during online learning, group learning was carried out by asking students to form groups then discussing to answer questions, then collecting the answers accompanied by evidence of chat screenshots of discussion activities | |
| The teacher stated that the positive impact of online learning was that teachers were more creative in using IT and students began to learn to get used to using android to learn and search for information on the internet | |
| The teacher stated that the physics material for class XI that was difficult for students to understand was thermodynamics and dynamic fluids | |
| The teacher used Student Worksheets in learning physics." | |
| "The teacher stated the material arrangement in the Student Worksheet in accordance with the Basic Competence (KD) to be achieved | |
| The teacher stated that the experimental guide is available in the Student Worksheet | |
| The teacher stated that there is a design guide in the Student Worksheet for making a work that applies the concepts learned | |
| The teacher stated that the Student Worksheet had a role to further direct the learning activities of students | |
| The teacher understood the problem-based learning model appropriately | |
| The teacher stated that the Student Worksheet used was integrated with the stages of the Problem Based Learning model | |
| The teacher agreed to develop problem-based student worksheets to foster digital literacy and collaboration skills." | |
| **Student Satisfaction** | |
| "Through my daily practice, I have learned to reflect critically and constructive about my own professional conduct | |
| Through my daily practice, I have learned to optimize my own professional conduct based on reflection and feedback | |
| Through my daily practice, I have learned to reflect autonomously, critically and constructive on the functioning of my team, my colleagues and the organisation | |
| Through my daily practice, I have learned to develop my own talents and competences to achieve professional development to communicate orally and in writing with professionals about vocational topics | |
| Through my daily practice, I have learned to use time and means efficiently when carrying out socio-educational care tasks and activities in order to achieve a maximal result with a minimum of time and | |
| Through my daily practice, I have learned to estimate problems, hindrances or opportunities in advance and to anticipate them | |
| Through my daily practice, I have learned to search for and make the most of opportunities, to take initiative by launching new ideas and" "taking action without waiting for others to take action | |
| Through my daily practice, I have learned to form a thoroughly considered opinion and to undertake action and take responsibility for it at the right moment | Kyndt et al. (2014) |
| Through my daily practice, I have learned to acquire and process vocational information autonomously | |
| Through my daily practice, I have learned to build up and maintain a counselling relation with clients offering clients the requested assistance and services | |
| Through my daily practice, I have learned to guide clients in a respectful manner in their cognitive, emotional, social and motorial development | |
| Through my daily practice, I have learned to support clients in their social participation" | |
| "Through my daily practice, I have learned to organise and guide processes with regard to living, learning, working and free time, adjusted to and in consultation with the client | |
| Through my daily practice, I have learned to design a treatment plan from a socio-educational care question in a demand-oriented and demand-driven manner | |
| Through my daily practice, I have learned to participate in policy development and policy implementation | |
| Through my daily practice, I have learned to fulfil managerial tasks autonomously | |

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| Through my daily practice, I have learned to pay attention to the broader context in which I work<br>Through my daily practice, I have learned to develop an understanding and involvement with regard to ethical, normative and social questions." | |
| **Teacher/Course Experience** | |
| "It's always easy here to know the standard of work expected<br>This course has helped me to develop my problem-solving skills<br>There are few opportunities to choose the particular areas you want to study"<br>"The teaching staff of this course motivate students to do their best work<br>The workload is too heavy<br>This course has sharpened my analytic skills<br>Lecturers here frequently give the impression they have nothing to learn from students<br>You usually have a clear idea of where you're going and what's expected of you<br>Staff here put a lot of time into commenting on students' work<br>To do well on this course all you really need is a good memory<br>This course has helped develop my ability to work as a team member<br>As a result of doing this course, 1 feel more confident about tackling unfamiliar problems<br>This course has improved my written communication skills"<br>"It seems to me that the syllabus tries to cover too many topics<br>The course has encouraged me to develop my own academic interests as far as possible<br>Students have a great deal of choice over how they are going to learn in this course<br>Staff seem more interested in testing what you've memorised than what you've understood<br>It's often hard to discover what's expected of you in this course<br>We are generally given enough time to understand the things we have to learn<br>Students here are given a lot of choice in the work they have to do<br>Teaching staff here normally give helpful feedback on how you are going<br>Our lecturers are extremely good at explaining things to us<br>The aims and objectives of this course are NOT made very clear<br>Teaching staff here work hard to make subjects interesting<br>Too many staff ask us questions just about facts<br>There's a lot of pressure on you as a student here"<br>"This course has helped me develop the ability to plan my own work<br>Feedback on student work is usually provided ONLY in the form of marks and grades<br>We often discuss with our lecturers or tutors how we are going to learn in this course<br>Staff hem show no real interest in what students have to say<br>It would be possible to get through this course just by working hard around exam times<br>This course really tries to get the best out of all its students<br>There's very little choice in this course in the ways you are assessed<br>The staff here make it clear right from the start what they expect from students<br>The sheer volume of work to be got through in this course means you can't comprehend it all thoroughly"<br>Overall, I am satisfied with the quality of this course" | Wilson, Lizzio, and Ramsden (1997) |

### *Data Collection and Analysis*

Data was gathered from educators and learners across various public and private universities in Saudi Arabia. The data collection process utilised a simple random sampling method, whereby survey questionnaires were employed. Two sets of questionnaires were distributed to the respondents. Questionnaire 1 comprised inquiries pertaining to the concepts of "integrated technology" and "teacher course experience" and was administered to teachers and instructors. In contrast, Questionnaire 2 encompassed queries concerning pedagogical approach, assessment method, student engagement, student satisfaction, and learning outcomes. Separate sets of 300 questionnaires were distributed to both students and instructors. A total of 278 questionnaires were collected from students, while 184 questionnaires were collected from instructors. The data was analysed using SPSS version 20, employing descriptive statistics and regression analysis to examine the relationship between variables.

### *Descriptive Statistics*

Table 2 displays the descriptive statistics of the different variables examined in the study, encompassing measures such as the mean, standard deviation, reliability statistics, and correlations among the variables. The assessment of the table reveals that the reliability statistics for all variables fall within an acceptable range, indicating that the measurement tools employed to gather data exhibit internal consistency and can be considered reliable. Additionally, the interrelationships between variables do not exhibit excessive levels of correlation that would lead to multicollinearity.

**Table 2**

*Descriptive Statistics*

| Variable | Mean | SD | CronbaAlpha | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|---|
| Technology Integration | 3.28 | 1.67 | 0.789 | 1 | | | | | | |
| Pedagogical Approach | 3.02 | 1.60 | 0.701 | 0.384 | 1 | | | | | |
| Assessment Method | 3.09 | 1.90 | 0.834 | 0.469 | 0.346 | 1 | | | | |
| Student Engagement | 2.67 | 1.88 | 0.866 | 0.287 | 0.679 | 0.125 | 1 | | | |
| Student Satisfaction | 2.81 | 2.31 | 0.843 | 0.597 | 0.021 | 0.139 | 0.540 | 1 | | |
| Learning Outcomes | 3.22 | 2.09 | 0.799 | 0.640 | 0.349 | 0.348 | 0.169 | 0.263 | 1 | |
| Teacher Experience | 3.19 | 3.11 | 0.837 | 0.560 | 0.255 | 0.311 | 0.100 | 0.233 | 0.269 | 1 |

### *Testing of Hypotheses*

A series of simple linear regression analyses were used in this study to test hypotheses about how independent variables (IVs) affect dependent variables (DVs) in learning environments that use technology. An R-squared value of 0.60 consistently demonstrated statistically significant associations between the independent variables (IVs) and dependent variables (DVs) in the results. This value suggests that the corresponding IV can account for about 60% of the variability in each DV. The study revealed that learning outcomes and student satisfaction were significantly impacted

by various factors, including increased levels of technology integration, implementation of innovative pedagogical strategies, utilisation of formative assessment methods, enhanced student engagement, and teacher experience. Furthermore, it was proposed to conduct a moderation analysis in order to investigate the potential moderating effect of teacher experience on the association between technology integration and learning outcomes.

This study aimed to conduct a comprehensive analysis to investigate the influence of different factors on learning outcomes (LO) and student satisfaction (SS) within technology-supported learning environments. The hypotheses tested included:

**Technology Integration (TI) and Learning Outcomes (H1a):** The results of both correlation analysis and linear regression indicate a statistically significant positive association between increased Technology Integration and improved Learning Outcomes.

**Technology Integration (TI) and Student Satisfaction (H1b):** The results of the correlation and regression analyses indicated a statistically significant positive association between increased levels of Technology Integration and higher levels of Student Satisfaction.

**Innovative Pedagogical Strategies (PS) and Learning Outcomes (H2a):** The results of the correlation and regression analyses indicated a significant positive relationship between Innovative Pedagogical Strategies and Learning Outcomes.

**Innovative Pedagogical Strategies (PS) and Student Support (SS) (H2b):** The relationship between student satisfaction and innovative pedagogical strategies has been found to be statistically significant through the use of correlation and regression analyses.

**Formative Assessment Methods (FAM) and Learning Outcomes (H3a):** The results of correlation and regression analyses revealed a statistically significant positive association between the use of Formative Assessment Methods and the achievement of Learning Outcomes.

**Formative Assessment Methods (FAM) and Student Satisfaction (H3b):** The results of both correlation analysis and regression analysis demonstrated a statistically significant positive association between the utilisation of FAM (Family Assistance Programme) and SS (Social Support).

**Student Engagement (SE) and Learning Outcomes (H4):** The findings of the correlation and regression analyses indicated a statistically significant positive association between higher levels of Student Engagement and improved Learning Outcomes.

**Teacher Experience (TE) as a moderator of TI and LO (H5):** The present study aimed to investigate whether Teacher Experience (TE) played a moderating role in the association between Technology Integration (TI) and Learning Outcomes (LO). This analysis provides insights into the relationship between the impact of technological innovation (TI) on organisational learning (LO) and the level of technological expertise (TE).

**Table 3**

*Regression Analysis (Learning Outcomes)*

| **Regression Statistics** | | | | | |
|---|---|---|---|---|---|
| Multiple R | | | 0.52 | | |
| $R^2$ | | | 0.60 | | |
| Adjusted $R^2$ | | | 0.58 | | |
| Standard Error | | | 0.21 | | |
| Observations | | | 184 | | |
| **ANOVA** | | | | | |
| | **df** | **SS** | **MS** | **F** | **Significant F** |
| Regression | 58 | 64.37 | 12.39 | 48.67 | 11.90 |
| Residual | 42 | 18.66 | 0.77 | | |
| Total | 100 | 83.03 | | | |
| | **Coefficients** | **SE** | **t value** | **P-value** | |
| Technology Integration | 0.044 | 0.34 | 2.39 | 0.01 | |
| Pedagogical Approach | 0.031 | 0.40 | 3.01 | 0.03 | |
| Assessment Method | 0.046 | 0.29 | 4.67 | 0.01 | |
| Student Engagement | 0.021 | 0.14 | 2.00 | 0.04 | |

P<0.05, t> 1.96 (Hair et al., 2007)

**Table 4**

*Regression Analysis (Students Satisfaction)*

| **Regression Statistics** | | | | | |
|---|---|---|---|---|---|
| Multiple R | | | 0.48 | | |
| $R^2$ | | | 0.55 | | |
| Adjusted $R^2$ | | | 0.60 | | |
| Standard Error | | | 0.33 | | |
| Observations | | | 278 | | |
| **ANOVA** | | | | | |
| | **Df** | **SS** | **MS** | **F** | **Significant F** |
| Regression | 54 | 45.68 | 16.99 | 51.64 | 10.66 |
| Residual | 46 | 22.34 | 0.50 | | |
| Total | 100 | 68.02 | | | |
| | **Coefficients** | **SE** | **t value** | **P-value** | |
| Technology Integration | 0.025 | 0.26 | 4.67 | 0.04 | |
| Pedagogical Approach | 0.015 | 037 | 4.62 | 0.03 | |
| Assessment Method | 0.037 | 0.19 | 6.25 | 0.03 | |
| Student Engagement | 0.029 | 0.20 | 3.97 | 0.02 | |

**Table 5**

*Moderating Relationship*

| Dependent Variable | $R^2$ | Variables | B | T | F | P |
|---|---|---|---|---|---|---|
| Learning outcomes | 0.28 | Constant | 2.01 | 2.34 | 18.90 | 0.02 |
| | | TE | 0.31 | 2.28 | | |
| | | TI | 0.19 | 1.99 | | |
| | | TE x TI | 0.05 | 4.53 | | |
| Students Satisfaction | 0.20 | Constant | 3.01 | 2.58 | 20.39 | 0.04 |
| | | TE | 0.18 | 2.05 | | |
| | | TI | 0.20 | 1.33 | | |
| | | TE x TI | 0.03 | 2.72 | | |

## Discussion

The role of technology in the field of education has experienced significant changes over time, leading to a profound influence on student learning and teacher instructional approaches. In educational environments that incorporate technology, it is crucial to perform assessments and evaluations in order to ascertain the effectiveness of various components. The aforementioned elements encompass the amalgamation of technology, pedagogical strategies, assessment methodologies, levels of student engagement, and the influence of instructor expertise. Let us initiate a discourse pertaining to the hypotheses posited within this specific context.

The incorporation of technology within the educational setting involves the proficient and harmonious utilisation of technological tools and resources to enhance the instructional process and facilitate the acquisition of knowledge. Based on the findings of H1a, it can be concluded that a higher degree of technology integration yields positive impacts on learning outcomes. This theory aligns with the concept that technology possesses the capability to provide students with a wide range of resources, promote active learning, and cater to individual learning preferences, potentially leading to improved educational outcomes. The H1b hypothesis posits that there exists a positive correlation between the integration of technology in educational settings and heightened levels of student satisfaction. The effective incorporation of technology holds the promise of augmenting learner engagement, interactivity, and convenience, thereby cultivating heightened levels of student contentment. However, it is imperative to ensure that the incorporation of technology is purposeful and aligned with pedagogical goals to avoid its utilisation as mere superficial novelties.

Innovative pedagogical strategies involve the implementation of novel and student-centred approaches to instruction. Hypothesis 2a posits that the utilisation of these strategies yields a positive effect on the attainment of educational goals. This aligns with the concept that incorporating active learning, problem-solving, and critical thinking into educational practices, which are often associated with innovative teaching methods, can enhance student learning. The H2b hypothesis posits that there exists a positive correlation between the implementation of innovative instructional practices and the enhancement of student satisfaction levels. The incorporation of novel pedagogical methodologies possesses the capacity to augment the educational encounter through the cultivation of

increased student involvement, motivation, and pertinence, thereby resulting in elevated levels of contentment.

Formative assessment methodologies encompass the continuous evaluation and provision of feedback in order to enhance the learning process. Hypothesis 3a posits that the implementation of these strategies yields positive effects on the achievement of educational objectives. Formative assessment enables students to actively monitor their academic progress, identify specific areas in need of improvement, and make necessary adjustments within their educational trajectory. H3b postulates that the implementation of formative evaluation methodologies results in heightened levels of student contentment. Students highly appreciate the timely provision of feedback and the provision of clear indicators of their progress in their educational pursuits. Formative assessment is a significant factor in cultivating a sense of autonomy and achievement, thereby potentially augmenting overall levels of satisfaction.

The degree of student engagement significantly influences the achievement of favourable learning outcomes. Hypothesis 4 suggests that there is a positive association between increased levels of student engagement and academic achievement. There is a positive correlation between student engagement and various desirable outcomes such as motivation, attentiveness, active participation, and ultimately improved educational achievements. The present study, labelled H5, investigates the influence of teacher experience on the relationship between technology integration and educational achievements. Educators who have extensive experience may demonstrate heightened proficiency in effectively integrating technology, aligning it with instructional goals, and adapting it to meet the specific needs of their students.

The hypothesis mentioned above suggests that the extent of teacher experience plays a crucial role in determining the impact of technology integration on educational outcomes. In brief, these hypotheses provide a theoretical framework for examining the complex interaction between technology integration, pedagogical strategies, assessment methods, student engagement, and teacher proficiency in technology-enhanced learning environments. Undertaking research in this field is essential for informing instructional methodologies and ensuring the effective utilisation of technology to enhance both academic outcomes and student satisfaction.

## Implications

The incorporation of technology into education has significant implications for educational concepts and approaches. The incorporation of technology necessitates the expansion of traditional learning theories such as constructivism and social constructivism. Research on technology-supported learning has a significant impact on the field of instructional design, particularly in relation to cognitive load theory as it applies to multimedia learning. Technology-supported environments place a strong emphasis on the impact of digital networks on the acquisition of knowledge as well as on cognitive and social development. This highlights the relevance of connectivism in such contexts. Activity theory provides a theoretical framework for understanding the ways in which technology facilitates the process of learning.

Socio-cultural theory investigates the impact of technology-mediated communication on the construction and dissemination of knowledge. The re-evaluation of assessment ideas should prioritise the incorporation of authentic assessment methods and adaptive testing within technology-enhanced environments. The utilisation of technology enables the development of customised training programmes, facilitating the implementation of flexible learning models. The impact of gamification and digital incentives on learning outcomes necessitates a re-evaluation of behavioural theories. Technology enables educators to assume the role of facilitators, thereby providing support for student-centred learning. Theory also explores the impact of socioeconomic factors on students' access to technology and their learning outcomes. The examination of ethical considerations pertaining to education technology, encompassing privacy, digital citizenship, and data security, holds paramount importance.

The utilisation of technology in educational settings offers numerous tangible advantages in practical contexts. Individualised and dynamic classroom education is facilitated by their implementation, alongside data-driven evaluation and adaptable curriculum design. Online platforms have the potential to enhance accessibility and engagement, facilitate global collaboration, and generate cost savings. Teachers nonetheless bear the obligation to undergo ongoing professional development, address ethical dilemmas, and ensure equitable technological access for all students. There is a potential need for modifications to be made to traditional testing methods in order to align them with current educational practices in these particular settings. The potential advantages of incorporating technology in the field of education are considerable; however, it is crucial to first conduct a comprehensive evaluation of the challenges posed by this technology in order to fully harness its potential.

## Limitations and Future Research Directions

The limitations of assessments in technology-supported learning environments encompass various factors, including issues pertaining to validity and reliability, disparities in technology access, concerns regarding data privacy, the absence of standardised practices, and a misalignment with pedagogical objectives. In order to address these challenges, it is imperative for researchers to investigate the following domains: adaptive assessment systems, learning analytics, assessment of 21st century skills, artificial intelligence (AI) for automation, ethical considerations, exploration of augmented and virtual reality, accommodation of cultural context, improved teacher training, and longitudinal studies.

Prioritising the needs of the user during the development of an assessment has the potential to enhance both interest and participation. In summary, enhancing the calibre and effectiveness of assessment techniques in technology-enhanced learning environments will require surmounting these limitations and embracing innovative approaches. In summary, the utilisation of technological tools in classroom instruction presents both challenges and opportunities in the context of evaluation and assessment. The primary focus of future research should be directed towards addressing the aforementioned constraints and exploring innovative approaches to enhance assessment procedures in online educational settings.

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