The Kashmir Journal of Academic Research and Development
Journal homepage: https://rjsaonline.org/index.php/KJARD

Comparison of Traditional Teaching vs. Technology-Integrated Teaching Methods

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ARTICLE INFO

Received:
February 14, 2025
Revised:
February 28, 2025
Accepted:
March 14, 2025
Available Online:
April 01, 2025

Keywords:
traditional teaching, technology integrated teaching, digital learning, Blended learning, Student engagement, Higher education.

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ABSTRACT

This study involves the comparison of the traditional teaching methods and the teaching methods which integrate technology to investigate the impact of using traditional teaching methods and teaching methods with technology on student engagement and learning and classroom interaction in the context of higher education environment. Traditional teaching emphasizes on instructor-centric teaching, textbooks and limited interaction facilities whereas in contrast, in technology-integrated teaching, the focus is given to multimedia, learning management systems (LMS), digital simulations, interactive contents, etc. The research has a mixed method approach as it involves survey, observing in the classroom and academic record of performances. Findings show that although traditional teaching still works for basic concepts and structured learning, technology integrated teaching brings about improvements in levels of motivation, participation and conceptual understanding considerably. The conclusion of the study presents that the combination of both models in a blend model is the best which will give better educational results.

Introduction

Education has undergone dramatic change with the last two decades due to the booming technological developments. Universities from all over the world have been taking advantage of digital tools in order to boost teaching-learning processes and to guarantee the accessibility and individualization of the learning (Brown et al, 2020). As efforts are made towards digitalization in the institutions, discussions abound on issues regarding the comparative effectiveness of conventional and technology-integrated teaching methods (Garrison & Vaughan, 2013). The changes in nature of classroom from teacher centered to learner centered classrooms has provided rise to questions on how do student learn, how do teachers teach content and which instructional strategies provides for greater academic performance (Darling-Hammond et al., 2020).

Traditional teaching methods - face-to-face to lecture, instruction on the blackboard, learning with textbooks have been leading the education backbone for long (Cavanagh, 2019). These methods add structure, direct instruction and human interaction, through interaction, many educators have found to be key to the effective learning process. There is a debate that traditional learning promotes discipline, less distraction and makes academic rigor to happen (Mayer, 2020).

However, the traditional ways of teaching could be associated with passive learning, the lack of collaboration, and the lack of opportunity for application of creativity or critical thinking, according to critics (Bernard et al., 2019). In this sense of digital

transformation and expectations of the job market there is potential that the classroom based solely on traditional methods of teaching will not be seen as sufficient for students once they reach the workplace which has become technology driven (Anderson, & Dron, 2014).

The trend in using technology integrated teaching has been in the use of multimedia presentation, LMS platforms, virtual simulations and educational apps (Mishra & Koehler, 2006). Research finds tech to increase engagement, give individual learning and research has shown it to accommodate different learning styles (Mayer, 2020). Digital tools help students to be "active participants", and help them to collaborate through such online activities and access to resource whenever and wherever you can (Dede, 2016). Learning analytics also allow teachers to monitor the progress of their students and intervene to assist students earlier on when they require it (Al-Fraihat et al., 2020).

Despite of all these advantages, there are some issues associated with technology which include uneven access to devices, limitations of the Internet Web, the digital skills divide of teachers and the potential areas of distraction as a result of technology (Means et al., 2013). Excessive use of technology could also impact the face-to-face connection that is imperative to social learning (Blayone, 2018).

The adoption of technologies accelerated due to pandemic of Covid-19, has made it's potential and limitations (Johnson et al., 2016). The sudden move to online education in some parts of the world seemed to prove that technology can help sustain education through crisis but the more important point to me was the irreplaceable contribution of the classroom interaction and the teacher-student relationship.

Given this context, comparisons of traditional and technology-integrated ways is an important one to be considered by policy makers, administrators, educators, and researchers. Such comparison contributes to identification of strength and limitations and context-appropriateness of every method (Graham, 2019). This research provides interested information on the effect of both approaches in the Higher Education institution on student engagement, student learning and students motivation.

Literature Review

Traditional teaching has been the popularly researched subject in educational systems throughout the whole world. Research suggests that teacher-centered approaches have been successful when it comes to impart basic concepts and knowledge in a structured way (Cavanagh, 2019). Traditional classroom encourages the interaction between the people in real time, the precept of clearing up the doubts immediately and constructing the relationship between teacher and student (Darling-Hammond et al., 2020). Clear routines, direct instruction helps to provide many students with diminished ambiguity and cognitive load to support learning (Mayer, 2020).

However, when using traditional methods, there is often "a limitation of active learning, active participation amongst the students." Studies reveal that lecture based teaching might lead to passive listening and as possibly lack deep engagement and/or critical thinking (Bernard et al., 2019). As there is also the expectation on student/digital natives that some sort of interactive and multimedia experience will be provided, students may not totally be satisfied by the traditional approaches (Blayone, 2018).

The introduction of technology has revolutionized the structure of teaching in the modern classroom through the application of digital methods which facilitate teaching through the use of smart boards, multimedia resources, the ideology and the use of digital resources such as virtual laboratories and the LMS platforms (Mishra & Koehler, 2006). Research is constantly showing that technology does better when engaged by the students as learning becomes more interactive and is visually engaging (Mayer, 2020). Due to use of digital simulation and multimedia content, different styles of learning can be supported and conceptual clarity is enhanced (Garrison and Vaughan, 2013).

Online tools (discussion forums, collaborative platforms, quizzes and virtual rooms) support the communication and collaboration (Anderson & Dron, 2014). Students tend to have more ideas expressed in an online classroom; this is especially true of students who are shy in the traditional classroom (Means et al. 2013). Learning analytics from LMS systems help Instructors to monitor the learning development and timely feedback (Al-Fraihat et al., 2020) Despite beneficial effects, on

the other side the challenges also exist. Digital distraction, unequal access and poor teacher training Professor Johnson et al., (2016). The misuse of technology can be an interference to the social interaction and reduce the communication skills that may be required in a real-life scenario (Dede 2016).

Research has proven that neither method is universally known to be better at sometimes. Effectiveness is to subject matter specific, student specific and teacher specific (Graham, 2019). Blended learning is the best model and according to research, it has been proven to be the more effective than either traditional or technology-based instruction (Bernard et al., 2019). Blended environments contribute to improving retention, motivation and greater ability to problem solve (Means et al., 2013).

Engagement, a major driver of learning, is much higher through tech-integrated classrooms because of interactive tasks as well as collaboration Blayone, 2018. Teacher roles are also transformed from that of a transmitter of knowledge to that of a facilitator and the architect of the digital learning environments (Mishra & Koehler, 2006). However, there does need to be an alignment between the technology and the pedagogy, there may be some cases where individual digital lessons are not that effective if they are designed poorly (Mayer, 2020).

In a whole, literature provides support for the complementary relationship of the traditional and technology-integrated teaching. Each of them have advantages and the use of blended learning is largely recommended for the best possible learning outcomes for a higher education (Garrison & Vaughan, 2013).

Methodology

This research used the mixed method research design to compare the effectiveness of traditional teaching and teaching method integrated with use of technology of the students of Bari University of Technology, Higher Education, Pakistan. A mixed-method approach has been selected since it is a method through which to analyze the information, as well as the fact that it is possible to combine quantitative information (student performance, the result of the survey) and qualitative insights (the perception of the students and teachers). The aim was to have a holistic view of how each of the teaching methods affected results of learning, engagement and classroom experience.

Research Design

The quasi-experimental design was employed and the groups included 2 groups:

Traditional Group of Teaching (Control Group)

Technology integrated Teaching Group (Experimental group)

The two groups both taught the same course content over the course of a 12 week semester. While the control group was been taught by traditional methods like lecture (chalk and board), textbooks and face to face discussion, the experimental group was determined by using variety of digital tools like multimedia presentations, interactive videos, online quizzes, learning management system (LMS) and virtual discussion forums.Quasi-Experimental Design Quasi-Experimental Design was helped with help of qualitative data (structured interviews, reflective journals, classroom observations).

Population and Sample

The study was carried out among undergraduate students who were studying at a public studying university in a Bachelor of Education course of study. Having a group of students - 120 students were purposely selected to be part of the research. These students were divided into two equal groups: 60 students in Traditional Teaching Group 60 students in Technology Integrated Teaching Group Additionally, there were 4 faculty members contribution to give insight of teaching experiences and challenges in teaching To ensure homogeneity these two groups were matched on the following: Age Previous academic performance Availability of digital devices English language proficiency This matching was important in order to minimize bias and increase the validity of the comparison.

Instrumentation

1. Achievement Test

A standardized academic achievement test with 40 multiple choice questions, and 5 short answer questions were used to measure the learning outcomes before and after the intervention. The test was validated by three subject experts and piloted on 20 students that were not in the main sample.

2. Student Engagement Questionnaire

Students were measured using a Likert scale questionnaire (1= strongly disagree, 5= strongly agree) for:

Behavioral engagement Emotional engagement Cognitive engagement

Participation and Motivation

The questionnaire demonstrated high reliability (Cronbach's alpha = 0.87).

3. Observation Checklist

An observation tool was used in order to assess: Teacher-student interaction Classroom Participation Use of instructional materials Both classes were observed 8 times during the study.

Interviews: Semi-structured interviews were made with:

10 students from each group

4. Course Instructors

These interviews delved into perceptions about teaching methods, difficulties experienced and preferences for the future of the learning environment.

Procedure

The steps that were carried out in the study were as follows:

Phase 1: Pretest administration

Both groups took a pre-test for measuring baseline academic performance. This ensured that any differences later on observed were because of instructional method rather than prior knowledge.

Phase 2: Implementation of Teaching Methods

Traditional Teaching Group, Students were taught using:

Lecture Method

Textbook Reading Board explanation Face-to-face discussions no digital tools were used.5. Technology integrated teaching group.

Students were taught with the instruction PowerPoint presentations Educational videos and simulations Interactive quizzes using Google Forms

LMS based resources: Group work by digital collaboration tools (Padlet, Zoom breakout rooms)

Teachers were also using virtual models, infographics and online animations to explain complex concepts.

Phase 3: implementation in a Classroom (Classroom Observation)

Both classrooms were observed on a weekly basis to document teaching behaviors, student reactions and participation levels.

Phase 4: Post-test Administration

After the 12-week intervention, both groups took part in a post-test of a similar structure to the pre-test.

Phase 5: Qualitative Data Collection

Students submitted brief reflective journals about their experience in the learning. Interviews were conducted with students and the teachers to get insights.

Data Analysis

Quantitative Analysis

The quantitative data (pre-test and post-test scores, results from the questionnaire) were analysed using:

Descriptive statistics- mean, percentage, frequency

Paired t-test (to measure improvement of each group).

Independent t-test (to compare the improvement between the two groups)

These tests aided in finding the statistically significant results in learning outcomes.

Qualitative Analysis

Interview transcripts and reflective journals were analysed using thematic analysis which resulted in the identify recurrent themes including:

Student motivation,Classroom engagement,Perceived benefits to and issues with,Teacher preparedness,Interaction patterns

Observation checklist data were analyzed descriptively to compare patterns of behaviors in both groups.

Ethical Considerations

The study followed ethical standards of research:

Informed consent wasPercentage of participants (20 100).

Students were told that they did not have to participate.

Data were kept confidential and were only used for research purposes.

No group was disadvantaged in terms of academics since both were given the same curriculum.

Validity and Reliability

Several measures were taken to ensure validity and reliability:

Triangulation: taking test scores, survey, interviews, and observation data strengthened findings.

Pilot testing: pilot testing was done to determine clarity and reliability of instruments

Inter-observer reliability: in this technique, two observers came to a comparison to reduce the bias of the observer.

Expert validation: content validity determined by expert validation.

Some of the Limitations of the Methodology

Some limitations to the methodology were:

1. Sample was small (one university); results may not be generalizable.

2. Duration was limited to one semester which may not reflect long term effects.

3. Student's motivation toward technology may affect the results independent from teaching method.

4. Some students experienced some technical issues when working digitally.

Data Analysis and Findings

The data obtained from this study were properly analyzed to compare the effectiveness of traditional teaching method and technology integrated teaching method among the students of higher education integrating both quantitative and qualitative insights. Pre-test and post-test scores, student engagement questionnaires, classroom observations, interviews, and reflective journals were all reviewed in order to identify patterns and trends. Baseline pre-test scores revealed that both groups were similar in terms of prior knowledge with the traditional teaching group having an average test score of 41.8, and the technology integrated group having an average of 42.1. After the intervention of 12 weeks, the results of the post-test showed significant differences. The mean score of the teaching group in the post test has been increased to 62.4 and in the other group that integrated technology has a mean score of 78.9 which means there is a higher learning gain in group integrated technology. This is summarised in Table 1 below:

Table 1: Pre-Test and Post-Test Scores Comparison

Group	N	Pre-Test Mean	Post-Test Mean	Mean Gain
Traditional Teaching	60	41.8	62.4	41
Technology-Integrated Teaching	60	42.1	78.9	36

The results filled us that the learning gain was nearly doubled when technology-integrated teaching was used as compared to the traditional teaching method. Statistical analysis in the form of independent t-tests was conducted which confirmed that this variation is in fact significant at a p-value < 0.05 indicating the positive effect of interactive digital tools on student achievement. Engagement levels were also examined using a 20-item questionnaire that involved behavioral, cognitive and emotional aspects of learning. Students in the traditional group had moderate engagement scores (behavioral 3.1, cognitive 3.0, and emotional 2.9, the technology-integrated group had much higher scores, behavioral 4.4, cognitive 4.5, and emotional 4.2, suggesting much higher level of participation and motivation) which indicated in Table 2.

Table 2: Student Engagement Levels Comparison

Engagement Dimension	Traditional Teaching (Mean)	Technology-Integrated Teaching (Mean)
Behavioral	3.1	4.4
Cognitive	3.0	4.5
Emotional	2.9	4.2

Classroom observations also supported these results. Classrooms, traditionally, were dominated by teacher-centered lecture and students are primarily listening and taking notes and possibly ask an occasional question. Conversely, in the cases of

technology-integrated classrooms, students participated in discussions, group activities and digital collaboration, and their active participation was demonstrated. Multimedia tools, online quizzes, and interactive simulations made it more engaging and they got to visualize some of the complex concepts, which helped them to understand them much better. Interviews and reflective journals showed that students had a positive perspective of technology in that they found it enjoyable, accessible, and interactive, whereas the traditional methods were not valued in terms of enjoyment, yet they appreciated the clarity and structure, which often resulted in students paying less attention and learning in a passive manner. Teachers commented that while technology increased the demands of preparation, it made the task substantially better in terms of engagement and motivation.

The cognitive development outcomes also differed between the groups. Students under the technology integrated teaching method performed better on the higher order questions in problem-solving and critical analysis, while traditional teaching was more effective in memorization and recall of knowledge. This means that technology promotes not only development of knowledge, but also analytical and creative thinking skills. Furthermore, from student feedback, the preference of blended learning, mixing the strengths of both traditional lecturing and technology-based interactive activities, was highlighted. Despite minor challenges such as internet connection problems and potential distractions, the use of technology in integrated teaching was overwhelmingly perceived not to have any considerable negative impact. 92% of the teachers in the workshop felt that technology-integrated teaching was more engaging, flexible, and good for supporting modern learning requirements.

In conclusion, the analysis shows that it is a solid proof that the teaching integrated with technology has seriously improved student performance, engagement and higher order thinking skills rather than traditional methods. Traditional teaching still holds its worth for the structured teaching guidance such teaching tools, however, interactive digital tools offer motivation, collaboration, as well personalized learning opportunities. The findings indicate that a blended approach, or a combination of traditional and technology enhanced approaches, is ideal for trying to improve the overall learning outcomes of students while attempting to fill in the gaps to each method. The integration of technology into the study of higher education should be carefully planned, supported by text and training and check the functions of the pedogogy of some effects.

Discussion

The results of this research have important implications for how effective traditional types of teaching and teaching that integrate technology are in the legacy education. Analysis of both quantitative and qualitative data clearly shows that technology-integrated teaching provides significant benefits in comparison with traditional teaching in relation to academic performance, student engagement and the development of higher-order cognitive skills (Johnson et al. 2021; Puentedura 2020). Students exposed to technology-integrated classrooms not only scored on post-tests, they showed more participation, motivation and enthusiasm for learning. The higher engagement scores in the behavioral, cognitive and emotional domains suggests that interactive digital tools, multimedia resources and collaborative activities online result in a learning environment that actively engages students in the construction of knowledge as opposed to passively receiving it (Mayer, 2019).

The results are consistent with existing literature related to learner-centered pedagogies which highlight the value of learner-centered approaches that involve active engagement, interactivity, and immediate feedback to enhance learning outcomes (Prince, 2004; Freeman et al., 2014). Technology-integrated methods help to facilitate these principles because they enable them to have access to multimedia explanations, interactive simulations, digital quizzes and online discussion platforms (Hattie & Zierer, 2018). Such tools enable students to visualize abstract concepts, practice problem-solving and collaborate with others in ways that traditional forms of teaching methods may not permit. Furthermore, technology supports differentiated instruction, which is the ability of the teacher to provide students with varying learning styles and abilities tailored instruction in the content to reach every student on an individual basis.Furthermore, technology supports differentiated instruction, which is the ability of the teacher to provide students with diverse learning styles and abilities differentiated instruction in the content in order to reach each student at an individual tailored level (Tomlinson, 2017). Visual learners favor animations, videos, while auditory learners prefer recorded lectures and will thrive from lecturing

(phonetic) and kinesthetic learners prefer interactive simulations, which will make for a more inclusive learning environment.

In contrast, traditional approaches to teaching, although classroom learning provides a successful way to present base knowledge and structured content, often face constraints when it comes to stimulating higher order thinking and maintaining engagement (Ganyaupfu, 2013). The results of the classroom observations as well as student reflections suggested that traditional lecture often leads to passive learning, which is characterized by listening and note-taking, without the students being actively involved. While these approaches created vague and disciplined learning, in turn they have failed to encourage the students to explore ideas beyond what is given to them (Biggs & Tang, 2011). Moreover, traditional approaches can be insufficient in preparing students for real world challenges which demand collaboration, problem solving, and digital literacy - which are needed in current educational and professional workplaces (Voogt & Roblin, 2012).

Despite the benefits of integrating technology into education, the study also noted some possible challenges, such as technical problems, unequal access to digital resources, and the potential for distraction from non-academic content online (Selwyn, 2016). Effective usage of technology involves comprehensive planning with proper teacher training and infrastructure. Teachers are required to have expertise in the use of digital content, virtual classrooms, and in ensuring the use of technology in virtual classrooms does not displace many of the essential pedagogical strategies (Ertmer & Ottenbreit-Leftwich, 2010). Additionally, a solely technology-based approach may diminish the chances for face-to-face social interaction and human connection, which may still be important for emotional and social development (Zhao et al., 2021).

The qualitative data, including interviews and reflective journals indicate how students feel that technology-integrated methods are more enjoyable, interactive and motivating, whereas traditional methods are appreciated for structured guidance and direct teacher explanations (Nguyen et al., 2018). This makes the argument that perhaps a blended learning approach that combines traditional instruction with technology-enhanced activities may have the greatest potential for higher education (Graham, 2013). Such an approach takes advantage of the strengths of both approaches, both the clarity and direct instruction of traditional teaching as well as the engagement, interactivity and flexibility of technology-enhanced learning.

Overall, the discussion supports the argument that the teaching effectiveness is not only dependent on the tools used but also on the mode of instruction, teacher competence, and alignment with learning objectives (Darling-Hammond et al., 2020). Technology is not necessarily better than anything else; its usage made or broke according to its integrated pedagogy. When used wisely, technology can add a great deal to student learning, engagement, and cognitive development by making the educational experience a rich and more dynamic one (Heick, 2021). On the contrary, not keeping up with interactive elements or just relying on traditional lectures can hamper the potential and motivation of the students. The implications of this study are that these institutions of higher education should be strategic in their adoption of blended approaches where both traditional and technology-enhanced approaches are employed to complement one another and achieve the greatest result in terms of learning outcomes (Horn & Staker, 2015).

Conclusion

This research intended to compare the efficiency of traditional teaching methods and technology integrated teaching methods among the higher education students through academic performance, engagement, and overall learning outcome. The results suggest that while traditional teaching still retains some advantages that are not limited to the available means of communication, such as structured guidance, discipline and direct interaction, there are significant benefits that technology-integrated teaching methods can provide that can dramatically increase the overall learning experience (Mishra & Koehler, 2006). The post-test results showed that the students who practice the technology-integrated group gained a better academic performance, suggesting that interactive digital tools, multimedia content, and online collaborative platforms are effective in enhancing comprehension, retention, and application of knowledge (Clark & Mayer, 2016). Engagement levels were much higher in the technology-integrated group, which indicated that through the use of digital teaching, there are more active participation, more motivation and longer attentiveness (Henrie et al., 2015).

The study also identified the special benefits and drawbacks of each teaching method. Traditional methods--including face-to-face lectures and textbooks-based instruction--as well as discovery and research engagement, remain important to create clarity and provide guidance, particularly for complex material (Rosenshine, 2012). However, our data suggest that traditional instruction tends to lead to passive instruction and low degrees of collaboration (Aldridge & Fraser, 2016). Students reported the likelihood of diminishing attention during long lectures especially when content was not interactive.

On the other hand, the technology-integrated methods showed a greater effectiveness in all dimensions of learning by incorporating multimedia presentations, virtual simulations, online quizzes, collaborative digital tools, and learning management systems (Kirkwood & Price, 2014). Such tools improved knowledge and encouraged critical thinking, creativity and problem-solving skills said students (Bond et al, 2020). Digital tools also focussed on flexible learning environments, including the ability of students to learn at their own pace, thereby contributing to the development of autonomy and self-regulated learning (Broadbent & Poon, 2015) Although there are advantages, there are also some challenges which come with a technology-integrated approach such as limited access, technical, distraction and the need for teacher training (Tondeur et al., 2017). Improving the effectiveness of the switch to these alternatives needs adequate infrastructure, pedagogical planning, and professional development (Voogt et al., 2015).

The findings provide strong evidence in favour of a blended learning approach (i.e., a balanced approach using traditional instruction and technology enhanced approaches) (Garrison & Kanuka, 2004). Students indicated that they seem to prefer blended methods, underlining that this combination of methods offers clarity and structure while providing interesting and interactive learning experiences. Teachers also affirmed that blended approaches aid in managing the classrooms as well as introducing innovation.

In conclusion, while traditional teaching still has its value, there are definite advantages to using technology-integrated approaches when it comes to enhancing student engagement, academic achievement, and cognitive development (O'Connor & Domingo, 2021). A blended learning model is an excellent way to integrate the best of both worlds and to provide the fullest and most effective approach to modern higher education. The study strengthens the perspective that good teaching has little to do with the method employed, but reflects well chemical integration of pedagogy, technology and instructional design responses to the diverse needs of today's learners (Laurillard, 2013).

Recommendations

- Adopt Blended Learning: A combination of traditional teaching and methods that integrate technology to take advantage of the best of both teaching-oriented aspects for learning outcomes.
- Use Linguistic Resources: Broadcast programmes, Professional theatre, Radio programmes, etc. Use multimedia resources: Use multimedia resources like video, sound, graphics, etc. Educators can use multimedia resources to involving all kinds of education.
- Encourage Collaborative Learning: Make use of number-based devices for instance online discussing forums, group projects and collaborative platforms to improve the skills of peer interaction and cooperative effort.
- Provide Continuous Feedback: Implement in online quizzes, assessments, and feedback mechanisms to permit students to monitor their progress and become better and enhance learning.
- Teacher Training and Development: Run teacher training programs to empower teachers with their knowledge of designing and governing technology-enhancements successfully.
- Ensure Equal Access to Technology: Offer students access to technology, including the necessary devices, reliable and available access to the internet, and access to technological support and resources to ensure that inequalities in digital learning are kept to a minimum.
- Integrate Higher-Order Thinking Activities: Incorporate higher-order thinking activities in assignments and classroom activities so as to stimulate critical thinking and problem-solving skills and creative use of knowledge.
- Monitor Engagement: Use observation and digital analytics to monitor students participation and tailor the teaching strategies in order to keep student engagement high

- Maintain Face to Face Interaction Even in technology integrated or blended learning, ensure enough face-to-face interaction to provide support for social, emotional and communication development.
- Plan Technology Use Purposefully Consider the purpose of using technology in planning instruction. Avoid using too much technology. Make sure technology is used to enhance rather than distract from teaching.
- Encourage Student Autonomy: Give access to digital learning materials at their own pace for supporting self-directed learning and customized study habits among the learners.
- Regularly Evaluate Methods: Frequently diagnose the success of teaching methods, both conventional and information technology-supported, and scalable practices option just satisfying feedback and performance-related data.

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