

Application of Instructional Technology with Information-Based Teaching Evaluation to Improve Pedagogy for Universities' Computer Courses in Nanchang

He Ying*

heyings11@student.usm.my

Centre for Instructional Technology and Multimedia
Universiti Sains Malaysia, Malaysia

Wan Ahmad Jaafar Wan Yahaya

wajwy@usm.my

Centre for Instructional Technology and Multimedia
Universiti Sains Malaysia, Malaysia

Corresponding author*

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ABSTRACT

Technology has created the biggest changes in the landscape of education. In the last few years, the concept of e-learning has helped learners to learn at their own space, pace, and convenience. Despite these breakthroughs, teachers from across the world tend to keep eye on the technology in the classroom with a combination of caution and optimism. On the contrary, the technology permits experiments with pedagogical techniques and analysis of the results to test the effectiveness of teaching. To address this issue, this study is conducted aims to apply instructional technology with information-based teaching evaluation to improve pedagogy for universities' computer courses in Nanchang. The objectives of this study are to assess the impact of instructional technology on teaching style. In this study, the deductive approach will be followed, and the quantitative research method will be followed. Additionally, the primary method of data collection will be used, and data will be collected from teachers of foundation courses in Nanchang. In total, 30 respondents will be recruited for the study and the purposive sampling technique will be followed. The data will be analyzed through statistical tests and graphical representations to assess the data more rigorously.

Keywords: teach online; information-based teaching evaluation; instructional technology

INTRODUCTION

Universities and colleges have been trying different technological innovations to provide teaching, including television, radio, videotape, and computer. For a long time, people have been trying to study the impact of these technologies on students' learning (Bullock & Ory, 2022). Digital technology has created a new situation of collaborative learning and self-direction. The links between teachers, students, and parents, as well as their physical infrastructure capacity, have been strengthened to form an overall environment conducive to formal learning (De la Garza et al., 2019). Those who encourage more use of digital technology in education believe that universities where students acquire 21st-century skills in a collaborative and personalized manner and at their pace, as well as teachers, are taking on the role of facilitators. Similarly, technology tracks the progress of students. The digital platform will bring learners, peers, tutors, and today's promoters of digital education, digital learning, digital resources, digital teaching methods, digital classrooms, and digital schools to believe in the prospects of digital technology in destroying and innovating ineffective educational models (De la Garza et al., 2019).

Instructional technology is an essential indicator for the modernization of education in China. The Chinese government leaders have paid massive attention to instructional technology in the last twenty years of opening-up and reforms. Many leaders of China, like Jiang Zemin, Li Lanqing, and Li Peng, wrote inscriptions and published instructions for the education of satellite and contemporary distance education. The State Council conducted a national meeting on the field of education in which it was decided that more focus should be connected to modern instructional technology, modernized, and a system of educational information must be promoted. The growth of instructional technology serves as an essential task in the modernization of education in China and is regulated by the leadership of the education ministers.

Thus, this research will be helpful for educational institutes to effectively implement instructional technology and to make strategies on a prior basis to address issues if encountered. This study will also benefit the Chinese government in devising policies to promote instructional technologies and make plans to practically implement them in different educational institutions like schools, colleges, and universities.

LITERATURE REVIEW

In this study, the social cognitive theory is used, and it is a theory rooted in the view of the agency of humans in which the people are agents who are proactively associated with their growth and make things occur through their actions. They are half architects of their destinies (Bandura, 2012). This theory is based on the perspective that people are imbued with specific capabilities that describe what it is to be human. The primary among these is the capacity to plan strategies, symbolize, learn through direct experience, self-reflect, and self-regulate. These capabilities offer human beings the cognitive mediums by which they are influential in identifying their destiny



(Chen & Dede, 2011). This theory is relevant to instructional technology that possesses adequate power in the capability of students of computer courses to coordinate with people worldwide quickly. The struggling students, particularly those conventionally underrepresented, would get more advantages from having a sense of belongingness and connectedness. The tools of social networking and immersive virtual environments are practical tools that aid in associating students of computer courses to use vicarious models or organizations to facilitate students in this regard (Chen & Dede, 2011).

Action Learning Theory

The theory of action learning originated in Europe and was put forward by Professor Reg Ravens of the United Kingdom in 1940. It is to carry out practical tasks in teaching activities to help learners improve their abilities and knowledge and actively explore the functions process. Educators should stimulate students' learning motivation and turn students' passive learning into active learning. The purpose of education should be to inspire students' thinking and broaden their horizons. Guide students to constantly summarize, reflect, explore, and innovate in the learning process to make progress (Marquardt & Banks, 2010). According to the action learning theory, to master a skill, we need to abide by the 721 principles, such as 10% of the time to learn knowledge and information, 70% of the time to practice and practice, and 20% of the time to communicate and discuss with others.

Instructional Technology

Instructional technology refers to the practice and theory of using technology for education. Including the development, design, use, evaluation, and management of educational technology, instructional technology takes various forms. Ranging from electronic whiteboards to online courses and classrooms of virtual reality, all are part of instructional technology (Online L.S.U., 2020). Instructional technology includes making materials for learning and pedagogy by researching application-proven methods that enable the process of learning and building skills and knowledge. With technological devices and technology enhancement in the last few years, instructional technology has grown and evolved by leaps and bounds. While it began early in the middle of the 20th century with an emphasis on making skills and improving knowledge, in the current day context, instructional technology has evolved with a focus on skills building, personalized learning, and meaning construction. Moreover, according to Malik (2018), educators can develop, design, deploy educational tools, and analyze the teaching of students quantitatively.

According to Robin (2008), the teacher's professional development includes the development of teachers' skills and knowledge in the instructional technology for them to communicate with students with a critical goal of making technology instruction in the classes more exciting and engaging. Many teachers need help to amalgamate technology effectively in learning and teaching processes (Gorder, 2008). As a result, the technology teacher's professional development and learning are significant for the smooth amalgamation of technology in learning and teaching (Kopcha, 2012). The technology teachers should be side by side with novel developments in using e-resources for learning and teaching. They must be digitally literate in 21st-century instructional technology. This helps them to keep up with the international developments in the utilization of technologies in education, boosting the theoretical yield of learners. Technology teachers' professional growth must be carried out at the school level to

address the technology-inclined challenges of the classroom rather than at the national or regional levels (Eteokleous, 2008).

Information-Based Teaching Evaluation

Taylor (1986) believed that teaching evaluation is essentially a process of verifying the implementation of teaching ideas and realizing educational goals. Education evaluation is more extensive and should focus on the whole process and results of education and collect relevant information to provide information guarantee for future education decision-making. The effectiveness analysis of information-based teaching should analyze the phased teaching effect, find the existing problems, and improve the teaching effect through expert guidance, experience interviews, and other methods. (Yang, 2012), information-based teaching should not only apply information technology to education but should move towards deep integration, realize the interaction between teachers and students, teaching and learning, and give full play to the subjectivity of teachers and students (Liu, et.al.,2021). The effectiveness of information teaching should be reflected in human development. Chen Zhenhua (2009) believed that the indicators of teaching evaluation should be reasonable, which would be subjective and affect the authenticity, but also could not be solidified. The hands of teaching evaluations were integrated based on the experience learned from the interaction between teachers and students. The index construction of teaching technology in the evaluation of information teaching requires time to pay attention to the latest teaching experience and make dynamic adjustments. Cai Min (2006) studied four points of teaching evaluation in American universities:

- First point: The evaluation runs through teaching, not only for teaching results.
- Second point: Pay attention to the development of students, and evaluation attaches great importance to student's academic achievements.
- Third point: The evaluation is aimed at the curriculum of a specific specialty, and the evaluation methods adopted by different majors will also be other.
- Fourth point: The content of the evaluation is based on empirical facts.

Teachers' subjective feelings about their teaching situation and self-evaluation are often used to explore teachers' teaching feelings and the intrinsic motivation for teachers' development. By designing a scale, J.D. Kammeyer-Mueller et al. divided teacher self-evaluation into four dimensions: self-esteem, emotional stability, self-efficacy, and control point. Zhang Xiang et al. applied the Karmeier-Muller scale to study teachers' teaching satisfaction in China. The results showed that teachers' self-evaluation could predict teaching satisfaction, and teaching satisfaction is an intermediary between self-evaluation and job performance. Teachers with a high evaluation of their own teaching will be more satisfied with their own work and recognize the value of their own work, encouraging them to continuously improve their teaching ability and promote professional development.

RESEARCH METHODOLOGY

This research will employ a deductive approach, and the rationale for using this approach is that this study will be focused on numerical and quantitative data. Additionally, in this study, the author

will move from general to particular and test the already established theories (Guo, 2013). Moreover, this research will use the quantitative research method because it will focus on quantifiable data and examine the incidence and their associations in an organized manner. Another reason is that this study will examine the responses with the help of quantitative measures by making links between different variables, regulating the occurrences, and assessing predictability (Gorman & Johnson, 2013). This method will be helpful because it effectively handles the reliability and validity measures.

Research Design

In the actual teaching activities, the teaching process can be divided into three links: before class, during class, and after class, and different teaching activities can be arranged in each connection (Laal & Ghodsi, 2012). (1) Before class. Students mainly engage in online learning, including autonomous online and collaborative learning. Before class, teachers can release learning resources and tasks to students through the sharing platform so that students can thoroughly understand the knowledge they have learned. Next, students can conduct collaborative learning, communicate with each other, issue questions, answer questions, and promote knowledge sharing and transmission. At the same time, teachers can screen out the key points, and knowledge attributes that students generally pay attention to and ignore according to the interaction of students and help and guide students to master knowledge through replies. (2) In class. It is mainly classroom learning, which advocates cooperation between students and encourages students to actively build knowledge. At the same time, teachers can put forward questions first, and students can conduct problem analysis and collaborative inquiry. Teachers can help students answer questions, stimulate students' interest in learning, and guide students to think. After solving the problem, organize students to summarize their knowledge. (3) After class. Teachers can assign extracurricular assignments and ask the team to cooperate with each other. Teachers use online guidance and offline assistance strategies.

The teaching evaluation should adopt diversified evaluation methods. The interaction and records of online collaborative learning will be saved on the network, and teachers can query the frequency of students' participation in discussions and opinions; For offline learning, teachers can make statistical records through attendance, homework after class, in-class tests, etc. At the same time, teachers take the final examination results of students as the primary reference basis to comprehensively test whether students' abilities have been improved to judge whether their teaching methods are effective and appropriately change the teaching methods according to their own feedback to improve the teaching quality.

Study Population and Sample

The population of this study will be the Chinese teachers teaching computer courses at different universities in Nanchang. Those who are leading other classes and not computer courses will not be a part of this research study. The gender will include both males and females, and all will be from 31 to 55 years.

Study Variables & Data Collection

The independent variables of this study will include collaborative learning, online learning, and real-time feedback, and the dependent variable will be the pedagogy style of teachers. In this

proposed study, the data will be gathered from the teachers of computer courses in Nanchang, and the data will be collected through a questionnaire (Asmus & Radocy, 2017). The questionnaire will be based on closed-ended questions, i.e., Likert Scale. The data will be gathered from 400 respondents because the more significant the sample size, the more accurate results will be generated (Render et al., 2018). In this research, the purposive sampling technique will be used because the participants will be selected based on purpose, and only those teachers will be chosen who are teaching computer courses in Nanchang.

Procedures

This study is divided into three stages:

- The first stage: preparation stage (October 14, 2022 - January 14, 2023): collect representative data and literature from both domestic and international sources and sort out research issues related to the topic Based on the online education ability model of teachers (2021), determine the research content and methods.
- The second stage: the implementation stage (February 8, 2023 - May 8, 2023) adopts quantitative research, designs questionnaires, and makes statistics on the collected data;
- The third stage: the summary stage (May 20, 2023 - August 20, 2023), tests the reliability and validity of the collected data results and analyzes the technical input of teachers in teaching and the overall situation of teaching methods.

Validity and Reliability

The evaluation of teaching effectiveness of teaching technology is the process of quantifying and objectifying the evaluation indicators at all levels. The design of the evaluation scale, the method of data collection, the processing of the evaluation results, and the inspection of the evaluation results can be used. (1) Design and determine the data collection method of the effectiveness evaluation scale. This study will prepare a questionnaire evaluating computer curriculum teachers in Nanchang universities. Teachers should pay more attention to which aspects when assessing the positive impact of college students learning and teaching methods, modify and prepare the evaluation questionnaire, and explain whether the evaluation scale is feasible through the analysis of the questionnaire results. (2) Reliability and validity test. The reliability of measurement generally refers to the probability that the same research technology will be used for two sizes when the same measurement object is tested, and the two measures may reach the same conclusion (Babbie, 2014). The correlation coefficient of the results of these two measurements is called the reliability coefficient, which reflects the size of the reliability. Its value should be between 0 and 1. This study will use SPSS to analyze the reliability of the collected valid questionnaires. If it is within the acceptable range, it indicates that the reliability of the questionnaire is good. (3)

Processing of evaluation data. Summarize the data of teaching evaluation and then process the primary singular value (Liu, 2014), and then analyze the teacher's evaluation value based on the comparison between each group of evaluation value and the previous evaluation value and characteristic value (such as maximum value and minimum value), to check the rationality of the monitoring distribution law and identify the mutation value and abnormal value.

Pilot Testing

To test the effectiveness of the evaluation of information teaching by teaching technology, this study will design the process of information teaching evaluation based on teaching technology to see whether it can be implemented in the computer classroom teaching activities of colleges and universities in Nanchang and test the practical effect of the teaching activity design in the computer classroom teaching of colleges and universities through experimental research. (1) Purpose of the experiment. This experiment aims to verify the feasibility and effectiveness of the teaching activity design by using the computer classroom information teaching evaluation activity design based on teaching technology. This study will select colleges and universities in Nanchang to carry out specific experimental research and choose one experimental class and one control class from each college to carry out the study through the data comparison before and after the quasi-experimental research method to verify whether the design of computer classroom information-based teaching evaluation activities based on teaching technology can solve the current problems of students' interaction in the school is not two-way, feedback is not comprehensive, not timely and not efficient, and whether it can improve classroom participation Whether stimulating learning motivation and improving classroom interaction can help teachers adjust teaching progress, improve classroom teaching evaluation methods and improve classroom education quality according to students' real-time and accurate feedback information. (2) Experimental tools. The use of specific experimental tools involves the classroom of the school's existing network, interactive whiteboard, mobile phones brought by teachers, PPT prepared for teaching, props, and students' exclusive Q.R. code cards and other tools. (3) Experimental process. First, before the experiment, to ensure the accuracy of the test results, through the primary level test, select one experimental class and one control class student with the same initial learning level in each university. The pretest results will use SPSS26.0 and Microsoft Excel to conduct an independent sample T-test on the students' mid-term computer course scores to verify whether there is a significant difference between the two classes before the experiment. Secondly, according to the design process of information-based teaching evaluation activities of university computer courses as the guiding framework, a specific teaching design will be implemented by selecting a section of content as a case in the first-year computer courses. Finally, after the end of the semester experiment, use the results of the first-year students as the post-test data, conduct a specific analysis of the post-test results of the experimental class and the control class through the SPASS26.0 data statistical analysis software, and conduct a satisfaction survey of the teachers of the experimental class, to verify the effectiveness of the teaching technology evaluation information teaching.

FINDINGS & DISCUSSION

This research will be carried out in Nanchang, a state in China. In this study, the teachers who teach computer courses in universities in Nanchang will participate in the survey. This study will not include teachers leading other methods and not teaching computer courses. There are 54 universities in Nanchang (University Guru, 2021), and all these universities will be selected for the analysis.



In this study, specific research subjects were selected for a questionnaire survey, and the issues gave a lot of substantive feedback in combination with the actual application, which is conducive to the development and analysis of the study. A lot of research shows that there are many factors that affect how computer teachers teach, such as the setting, the platform technology, the student, the teacher, and so on. To evaluate teachers' cognition, (Huang, et al., 2023) conducted a questionnaire survey. The respondents' evaluation teachers think that classroom teaching evaluation is necessary, accounting for 72.84%, and about 69.87% are willing to participate in the assessment. This shows that teachers' awareness of the importance of classroom teaching evaluation is in place, and their enthusiasm is high, which can reflect the relative scientific evaluation results.

There were 3 unrelated questionnaires this time, and 30 valid questionnaires were obtained with a recovery rate of 91%. The analysis results show that in terms of gender distribution, males account for 36.67% and females account for 63.33%; In terms of teaching experience distribution, 23.33% are under 5 years old, 30.00% are between 5-9 years old, 26.67% are between 10-14 years old, and 20.00% are over 15 years old; In terms of professional title distribution, professors account for 16.67%, associate professors account for 26.67%, lecturers account for 36.66%, and teaching assistants account for 20.00%; In terms of educational distribution, doctoral degrees account for 20.00%, master's degrees account for 66.67%, and undergraduate degrees account for 13.33%.

This study relies on Yang (2023) The collaborative learning group evaluation scale evaluates the effectiveness of teaching. Each teacher divides the collaborative learning teaching class into a group of six people. After the classroom tasks are completed, the evaluation scale is distributed online in the classroom. After the team leaders fill in the form, the evaluation scale is submitted to the teacher's computer through the network. Thirty teachers distributed 668 evaluation scales to two classes of collaborative learning and general learning, and 668 returned forms.

The results of the correlation analysis between participation and team performance in this study are shown in Table 1.

Table 1
 Correlation analysis between participation and team performance

	Team performance	
participation	Pearson related systems	.433
	Significance (Double tailed)	.000

The regression analysis between teacher-student relationships and learning effectiveness is shown in Table 2. According to the regression analysis results, it is believed that the teacher-student relationship has a significant positive impact on participation.

Table 2
 Regression analysis of teacher-student relationship and participation

Dependent variable	Independent variable	Unstandardized coefficient	B	t	p	容差	VIF
			B Standard error				
	(Constant)	1.613	.636	2.432	.000		
participation	teacher-student relationship	.147	.059	.236	2.053	.022	1.000
	ΔR^2			.361			
	F			57.748			

CONCLUSION

This research adopts the method of questionnaire to explore the impact of online collaborative learning on the effectiveness of information teaching evaluation. Analyze and discuss the data collected through analysis and statistics, combined with the questionnaire results (Yang, 2023).

In online collaborative learning, learner participation has a significant positive impact on team performance. In online collaborative learning, the more group discussions learners have, the higher their team performance will be. Research has shown that the number of individual speeches has a positive impact on academic performance. Students who speak more tend to have better grades, are more willing to express their opinions, and want other learners to accept their opinions. This is consistent with the results of this study. Learners are good at expressing their own ideas and communicating with other peers in group online collaborative learning, which will lead the whole team to brainstorm together, and lead students who seldom speak to discuss together. Therefore, the more team members speak, the higher the team's performance (Irimiás et al., 2022).

In online collaborative learning, teacher-student relationship has a significant positive impact on learning effectiveness. The teacher-student relationship has a significant impact on learning outcomes, and the better the relationship between learners and teachers, the more effective it is to improve learning outcomes. The online collaborative learning process can improve the stereotype of teachers in class in the past and show a relaxed environment for teacher-student collaboration. Most learners feel that the teacher is very kind and approachable, and every time they ask a question, the teacher patiently answers it.



By sorting out the research on the effectiveness of teaching technology in evaluating information technology teaching, raising questions, and summarizing previous research, the core concepts of this study are proposed. Use online collaborative learning to design and carry out teaching activities, optimize classroom teaching and ultimately promote students' learning ability. This study collected data in the form of a questionnaire and conducted relevant data analysis on the statistical results using SPASS26.0. From the perspective of questionnaire survey samples, the samples in this study mainly come from some representative universities in Nanchang City, Jiangxi Province. The sample size is not large enough, and it does not involve more regions. The sample selection is not extensive enough, and the value information obtained is relatively limited. From the perspective of preset indicators, due to the limited resources collected, the division of indicators may have strong subjectivity. Therefore, the indicators constructed in this study are only a reference for the effectiveness of ordinary university teaching technology in evaluating information technology teaching. More detailed operational indicators require teachers to combine themselves and form their own evaluation indicators for information technology teaching ability.



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About the Authors

	<p>He Ying is a Ph.D. student at the Centre for Instructional Technology and Multimedia, Universiti Sains Malaysia, Penang, Malaysia. She has been teaching since 2011 and has participated in the compilation of textbooks. Guide students to participate in the competition in 2022 and win the second national prize. Her areas of interest are Instructional multimedia, information-based teaching evaluation, and Innovation in Education.</p>
	<p>Wan Ahmad Jaafar Wan Yahaya is a professor at the Centre for Instructional Technology and Multimedia, Universiti Sains Malaysia, Penang, Malaysia. He graduated from the University of Leeds, United Kingdom with a Multimedia in Education Ph.D., and possesses a Master of Education (Computer in n Education) from the University of Manchester, United Kingdom. He has published more than 150 articles/papers in journals, conference proceedings, and book chapters. Most articles/papers are indexed in Scopus/WoS/ERA/MyCite. Her research interests include Instructional multimedia, Multimedia Project Management, Persuasive Technology, and Innovation in Education.</p>