

Self-efficacy, information communications technology integration and attitudes in online teaching: Basis for improved work performance framework

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Abstract

In the rapidly evolving landscape of education, the transformative impact of online teaching within the realm of vocational education stands as a pivotal subject of exploration. In order to develop an improved work performance framework, this study examines the effects of teachers' self-efficacy, information and communication technology (ICT) integration, and teacher attitudes in online teaching and vocational education management. For the purpose of providing an adequate and precise interpretation of the results, this study employed a descriptive research design. The experimental study took place in three different types of vocational schools in China: Qile University of ICT, Shandong Information Vocational and Technical College, and Shandong Animal Husbandry and Veterinary Vocational College. 385 vocational teachers were randomly selected from these three schools to participate. According to this paper, teachers demonstrate a high degree of self-efficacy when it comes to student engagement, class management, and technology use. There is a high level of agreement among teachers about how they have integrated ICT in terms of their ICT capabilities, knowledge, and resources, suggesting that they are generally confident and competent in using technology for educational purposes. Teachers have a positive attitude towards ICT based on affect, perceived usefulness, and behavior. Self-Efficacy, ICT integration, and online teaching attitudes have a significant relationship. A framework was created to enhance vocational teachers' work output.

Keywords: online teaching, self-efficacy, ICT integration, teachers' attitudes, vocational education

Self-efficacy, information communications technology integration and attitudes in online teaching: Basis for improved work performance framework

1. Introduction

The COVID-19 pandemic's latest effects have slowed down activity in educational institutions all around the world. 91% of global students have been affected. Fifth-grade teachers needed to adapt the way they prepared and executed their courses to facilitate learning from home. To provide a range of opportunities and interactions in online learning environments, students must become acquainted with ICT tools, resources, and learning platforms through internet networks. Online learning has only gained popularity recently due to significant technical advancements, although traditional teaching methods have been used for millennia. to examine the areas where online instruction and conventional instruction intersect and to get a working description of each. We might turn our attention to Richter (2017), who offers the following thorough explanation of online teaching management and its key components:

In most areas of human employment, routines and practices have undergone significant changes since the introduction of digital ICT. The 21st-century educational paradigm demands that ICT be used in both teaching and learning, that instruction take a multifaceted pedagogical approach, and that academic culture support honesty, innovation, and lifelong learning. ICT-integration learning has changed along with information communication technology's development, and demand for ICT in education has grown (Park, et. al., 2018). Actually, integrating ICT into the classroom has grown to be crucial to both teaching and learning. The principle of high-stakes accountability drives the contemporary educational system. To assist students become proficient in the content and reach student progress objectives, teachers must implement a variety of learning engagement tactics. As a result of this change, educators must provide dynamic, creative, and inventive teaching materials and tools to match the demands of remote learners. The effectiveness of ICT adoption initiatives may be impacted by obstacles relating to faculty attitudes, perceptions, and motives.

I looked at five factors in this study: (a) involvement in professional development related to ICT for teachers, (b) self-efficacy of teachers in online learning, (c) attitude toward ICT for teachers, (d) gender, and (e) age. A structure for the notion of invention spread. Understanding how shifting teacher expectations impact instructors' online teaching experiences is facilitated by the dissemination of innovations. It could be challenging for higher education institutions to keep employing traditional delivery techniques given the rise in adult and traditional learners enrolling and re-entering the system. According to Hsiung(2018), universities see distant learning as a way to give courses that can handle large enrollment and cut expenses related to traditional classroom spaces. Therefore, it would be helpful to comprehend how well-prepared instructors are for teaching online, how successful they are in this regard, and how attitudes toward ICT and computers may be connected to these characteristics.

Objectives of the Study - This study aimed to investigate the effects of teachers' self-efficacy, information and communication technology (ICT) integration, and teacher attitudes in online teaching and management of vocational education as basis for developing an improved work performance framework. More specifically, this paper attempted to describe teachers' self-efficacy in online teaching management from the aspects of student engagement, class management and the use of ICT; to determine teachers' ICT integration from the aspects of ICT capabilities, technological knowledge and technological resources; and to determine teachers' attitudes towards ICT in terms of teachers' affective attitude component, perceived usefulness component, and behavioral attitude component. In the meantime, the paper attempted to test the significant relationship between teachers' self-efficacy, ICT integration, and attitudes and developed an improved work performance framework for vocational education teachers.

2. Methods

Research Design - Descriptive research methodology was used in this study to guarantee precise and understandable data interpretation. This quantitative descriptive multiple linear regression study sought to determine if faculty self-efficacy in online teaching, faculty ICT integration and attitudes, gender, and age in higher education were related to their engagement in ICT professional development activities. This paper aims to describe teachers' self-efficacy in terms of active mastery, vicarious experience, and verbal persuasion; to determine teachers' ICT integration in terms of ICT use frequency, use proficiency, and related ICT awareness; and to determine teachers' attitudes toward ICT in terms of teachers' acceptance of ICT, forward-looking professional development, and innovation. Meanwhile, the research seeks to evaluate disparities in instructors' self-efficacy, ICT integration, and attitude, as well as the interaction between the three factors. The analysis is expected to make a significant contribution to the field of educational ICT.

Participants of the Study - The experimental study was conducted in three different types of vocational schools in China: Qilu University of ICT, Shandong Information Vocational and Technical College, and Shandong Animal Husbandry and Veterinary Vocational College, with 128 to 129 vocational teacher participants chosen at random from each school. The study's faculty members had either deliberately or involuntarily taken online coursework during the COVID-19 epidemic. One thing to note is that online teaching is most popular between 2020 and 2022, which is also influenced by China's education policy. As a consequence, the vast majority of instructors satisfied the fundamental qualifications for the disciplines specified in the questionnaire. These are the specific requirements. To determine if participants met the study's eligibility conditions, they underwent evaluation. It is required of participants to have prior experience with online courses and remote learning. A question about having taught or designed a course for distance learning was posed to the participants. If they said yes, they made progress in the study. If they gave a negative response, they did not go on to the survey questions. Due to the nature of the research, candidates must have developed or taught online courses, either in the past or at the time the survey was completed. Those who were not allowed access were automatically sent to the finish and thanked for their involvement in the survey. Upon fulfilling the research requirements, participants were required to peruse an online informed consent declaration. Participants indicated their agreement to participate by clicking next and answering the study's questions after reading the informed consent declaration.

Instruments of the Study - I was interested in determining if faculty ICT expertise, online teaching self-efficacy, and participation in ICT professional development activities were related. Regarding integration, attitudes, gender, and age in the context of universities. Online teaching effectiveness is the teacher's belief in his or her ability to plan and carry out strategies to accomplish desired goals in a virtual learning environment. Attitude is a tendency to respond positively or adversely to items in the environment. Compeau and Higgins define computer self-efficacy as assessing one's capacity to utilize a computer. The ESEOT and the ICTCAS scales were employed in this study. Approved by the supervisor of the research institute, researcher conducted a preliminary questionnaire survey and obtained the reliability of the survey, as shown in Table 1. Reliability results showed that the Cronbach's alpha for influence of Student engagement (0.849), Class management (0.860), Use of technology (0.845), ICT Capabilities (0.846), Technological Knowledge (0.855), Technological resources (0.848), Affective Attitude Component (0.850), Perceived Usefulness Component (0.855) and Behavioral Attitude Component (0.847) suggesting that the items have relatively high internal consistency.

Data Gathering Procedure - In terms of data collection, paper questionnaires were sent to participants who were professional instructors from three separate Shandong vocational universities. The first step was to reach out to three professional instructors from three different institutions, each of whom had at least one year of experience teaching online. Paper questionnaires were delivered to them, along with explicit instructions on how to utilize them. After that, in order to guarantee the accuracy of the responses supplied by the Graduate School of the University of the Philippines, three qualified teachers were given the task of fulfilling the requirements and further explaining to the participants the general purpose, function, and quantity of the questionnaire in the

simplest way possible. There are many questions in this study case, therefore you must be patient. As a result, it is believed that professional instructors who can answer the questions would thoroughly participate with the survey. After receiving the questionnaire, vocational teachers who are interested and willing to participate in the survey can directly answer questions on the provided questionnaire. In order to guarantee the quantity and caliber of the responses, the respondents receive tokens after submitting the questionnaire.

Table 1
Test of Reliability of the Study

| Indicator | Cronbach Alpha | Remarks |
|---|----------------|---------|
| Self-Efficacy in Online Teaching Management | | |
| A. Student engagement | 0.849 | Good |
| B. Class management | 0.860 | Good |
| C. Use of technology | 0.845 | Good |
| ICT Integration Scale | | |
| A. ICT Capabilities | 0.846 | Good |
| B. Technological Knowledge | 0.855 | Good |
| C. Technological resources | 0.848 | Good |
| ICT Attitude Scale | | |
| A. Affective Attitude Component | 0.850 | Good |
| B. Perceived Usefulness Component | 0.855 | Good |
| C. Behavioral Attitude Component | 0.847 | Good |

George and Malley (2003) provide the following rules of thumb “>0.90–Excellent,>0.80–Good,>0.7–Acceptable,>0.60 – Questionable,>0.50 –Poor, and <0.50 – Unacceptable”

The questionnaire is limited to 500 copies, about 170 copies for each school, and 450 genuine and valid questionnaires are preserved after invalid questionnaires are excluded. After that, data was gathered and statistically processed utilizing frequency counts, percentages, ranks, and weighted averages in SPSS 27.0 for interpreting, analyzing, and comparing participant replies. A limited sample of respondents will be employed for structural reliability and validity pre-analysis to guarantee the correctness and logic of the questionnaire structure before it is distributed widely. To guarantee the viability of empirical analysis, the questionnaire will be issued following amendment in accordance with the assessment results of the small sample pre-distribution.

Data Analysis - The statistical software IBM SPSS 27 was used to evaluate the data from this investigation (SPSS). The data was gathered using the online survey tool Qualtrics. The survey software transformed the data into an excel dataset, which was subsequently imported into SPSS. Finding and eliminating (or fixing) errors and inconsistencies from a data collection was the goal of data cleaning techniques. Data that was incomplete, erroneous, or irrelevant was recognized and changed, amended, or removed as needed. The information was visually verified to confirm that the choices were correct. Before statistical analysis, the data was double-checked and cleansed for mistakes. When determining the strength of a link between two variables, correlational approaches are used (Field, 2017). I investigated the variance between these factors in my multiple linear regression analysis. Relevant areas of the study examined the correlations between online teaching self-efficacy and ICT and computer attitudes, as well as the relationships between online teaching self-efficacy and ICT integration and computer attitudes of teachers involved in technical professional development. instructors who do not participate in technical professional development. In the section of the study that examined multiple linear regression, five variables were examined: (a) teachers' participation in technical professional development; (b) teachers' self-efficacy in online teaching; (c) teachers' attitudes toward computers and ICT; (d) gender; and (e) teachers' integration of ICT.

Ethical Considerations - Personal information about the respondents was not provided in this study for ethical and confidentiality reasons, save for their gender, school type, self-assessed self-efficacy, ICT integration, and attitudes. Before beginning the study, the researchers ensured that the participants had read and understood all of the instructions and study protocols, as well as the aim of the survey. The approach of willingly being probed was used to protect the respondents' rights. During this time, the confidentiality of the information and data obtained was protected with the highest care.

3. Results and discussion

A total of 385 valid questionnaires were collected for this righteous survey. Table 2 shows the age, gender, type of institution, current academic position, and highest degree of the respondents. Regarding the age of the questionnaire, 173 teachers (44.94%) were around 20–30 years old, 165 teachers (42.86%) were 31–40 years old, and 47 teachers (12.20%) were 40–50 years old and older. The composition of teachers in the surveyed institutions shows that vocational colleges are mainly composed of young and middle-aged teachers, which is in line with the overall staffing of the institutions. When it comes to the gender ratio, the proportion of female instructors is somewhat greater than that of male teachers; of the respondents in total, 207 (53.77%) are female teachers and 178 (46.23%) are male teachers. The reason that female teachers outnumber male teachers may be that teacher salaries in China are low, and because men are the primary breadwinners in their families, salaries in colleges are frequently insufficient to cover their families' daily expenses, so there are more female teachers in colleges. In addition to gathering basic data from respondents, the gender option in the questionnaire is also utilized for research. Several studies have found that gender inequalities remain in the usage of graduate school technology and associated skills at the University of the Philippines (Drabowicz, 2014). However, recent study does not allow us to infer if one gender is superior than the other in online courses. Males may have a clear edge over girls in an online classroom because of their increased computer familiarity, higher perceptual skills, and participation, according to many studies (Ashong & Commander, 2013). Furthermore, male students surpassed female students in terms of confidence in dealing with information and communication technology. As a result of the inconsistency of previous research results on gender differences at the Lyceum of the Philippines University Graduate School, this study attempts to explore gender differences from three dimensions through analysis.

Table 2

Summary Table on Teachers' Self-efficacy in Online Teaching Management

| Key Result Areas | Composite Mean | VI | Rank |
|----------------------|----------------|----------------|------|
| Student Engagement | 3.59 | Strongly Agree | 2.5 |
| Class Management | 3.59 | Strongly Agree | 2.5 |
| Use of Technology | 3.61 | Strongly Agree | 1 |
| Grand Composite Mean | 3.60 | Strongly Agree | |

Legend: 3.50–4.00=Strongly Agree; 2.50–3.49=Agree; 1.50–2.49=Disagree; 1.00–1.49=Strongly Disagree

An overview of instructors' self-efficacy in managing online instruction is shown in Table 2, providing key result areas, composite mean scores, verbal interpretations, and ranking information. The table indicates that the teachers' self-efficacy is assessed in three key result areas: Student Engagement, Class Management, and Use of Technology. The composite mean for each area is 3.59 for Student Engagement and Class Management, and slightly higher at 3.61 for Use of Technology. The verbal interpretations of these composite means are "Strongly Agree," indicating a high degree of self-efficacy in these areas among instructors. The Mean of the Grand Composite which averages these three scores, is 3.60, also indicating "Strongly Agree." This table provides insights into how teachers perceive their self-efficacy in these crucial aspects of online teaching.

With a composite mean of 3.61 and a verbal interpretation of "Strongly Agree," the indication at position 1—"Use of Technology"—indicates that instructors are the most confident in their ability to use technology for online instruction. This indicates a high level of confidence and competence in leveraging technology tools and platforms to facilitate online learning. Such a result can have positive implications for the effectiveness of online teaching, as it demonstrates that teachers are well-equipped to harness technological resources in their instruction. Moving on to indicators rated 2 and 2.5, Student Engagement and Class Management had composite averages of 3.59 and "Strongly Agree" verbal interpretations, respectively. These findings suggest that teachers are very self-sufficient in these areas. In terms of student engagement, teachers feel confident in their ability to maintain students' active participation in the online learning process. Class management reveals instructors' self-assurance in their capacity to uphold order and discipline in the online learning environment.

Last but not least, despite having the same mean as indicators ranked 2, the indicators at rank 3—Student

Engagement and Class Management, both with composite means of 3.59—reflect a high degree of self-efficacy. This means that teachers perceive their self-efficacy similarly in these areas. Teacher opinions, attitudes, and behaviors toward virtual learning can have an influence on students' learning results, particularly during the COVID-19 epidemic. Motivation and interest may have been affected by teachers' use of digital technologies, instructional strategies, and student interaction. If teachers weren't ready to adapt their traditional education to the demands of virtual learning, students' attention and involvement may have suffered throughout the teaching-learning process.

To summarize, Table 2 shows that instructors have a high degree of self-efficacy in important outcome areas pertaining to online teaching administration. "Use of Technology" had the greatest self-efficacy, followed by "Class Management" and "Student Engagement." These findings are critical for understanding the confidence and competence of teachers in delivering effective online education. However, it is essential to consider the context, resources, and training available to teachers when interpreting these results. The supporting literature provides additional insights and context for understanding these findings.

Table 3

Summary Table on Teachers' ICT Integration

| Key Result Areas | Composite Mean | VI | Rank |
|-------------------------|----------------|----------------|------|
| ICT Capabilities | 3.60 | Strongly Agree | 1 |
| Technological Knowledge | 3.59 | Strongly Agree | 2.5 |
| Technological Resources | 3.59 | Strongly Agree | 2.5 |
| Grand Composite Mean | 3.59 | Strongly Agree | |

Legend: 3.50-4.00=Strongly Agree; 2.50-3.49=Agree; 1.50-2.49=Disagree; 1.00-1.49=Strongly Disagree

Table 3 presents a summary of teachers' ICT (Information and Communication Technology) integration, with a focus on key result areas, composite mean scores, verbal interpretations, and rankings. The composite mean, which stands at 3.59, falls within the range of 3.50-4.00, signifying a "Strongly Agree" response from the surveyed teachers. This indicates a high level of agreement among the teachers regarding their ICT integration, suggesting that they are generally confident and proficient in utilizing technology for educational purposes. In this table, "ICT Capabilities" is the key indication at rank 1, with a composite mean of 3.60 and a verbal interpretation of "Strongly Agree." This indicates that educators firmly believe they have the required ICT skills. It is clear from an analysis of this data that educators possess the knowledge and abilities needed to successfully incorporate technology into their lesson plans. This outcome is consistent with past study findings.

The indicators at rank 2 are "Technological Knowledge" and "Technological Resources," both with a composite mean of 3.59 and a verbal interpretation of "Strongly Agree." These indicators share the second rank, suggesting that teachers strongly agree with their technological knowledge and the availability of technological resources for teaching. This indicates that teachers not only possess the necessary skills but also have access to the required resources to integrate ICT effectively. The category's high rank and composite mean highlight the significance of these aspects in enabling successful ICT integration in education. When it comes to incorporating technology and tying new technological resources to student engagement, educators are the change agents. Teachers can use technology in their courses in a variety of creative ways; some examples include game-based learning, virtual field excursions, digital presentation boards, and Web-based information access.

In a constructivist classroom, technology may also help students gain information by encouraging active engagement. As instruction moved from in-person to online, social bonds among students declined as a result of inadequate support during learning activities. Teachers and students were navigating the digital terrain as virtual learning was still in its infancy. Many teachers took use of their growing understanding of virtual learning and technological skills to give different learning opportunities to all pupils. The "Grand Composite Mean" for all indicators is 3.59, indicating a "Strongly Agree" response. This further emphasizes the overall positive perception of ICT integration among the surveyed teachers.

In summary, Table 3 provides insights into teachers' ICT integration, with a strong overall agreement among

teachers. Specifically, it highlights their strong ICT capabilities, technological knowledge, and access to resources. These findings are consistent with prior research, emphasizing the importance of teacher training, technological knowledge, and resource availability in successful ICT integration for educational purposes.

Table 4 presents a summary of teachers' attitudes towards Information and Communication Technology (ICT). The composite mean scores, verbal interpretation (VI), and rankings of the major outcome categories pertaining to the attitudes of teachers toward ICT are displayed in the table. The purpose of this table is to offer an overview of how teachers perceive and respond to ICT in their educational contexts. The grand composite mean for teachers' attitudes towards ICT is 3.61, which falls in the "Strongly Agree" range. This indicates that, on the whole, teachers have a positive attitude towards ICT, finding it highly useful and displaying strong behavioral and affective attitudes. Starting with the highest-ranked indicator at position 1.5, we find the "Teachers' Affective Attitude Component" with a composite mean of 3.61 and a VI of "Strongly Agree." This suggests that teachers have a strong positive emotional disposition towards ICT, indicating that they generally enjoy and appreciate using technology in their teaching practices.

Table 4

Summary Table on Teachers' Attitudes towards ICT

| Key Result Areas | Composite Mean | VI | Rank |
|--|----------------|----------------|------|
| Teachers' Affective Attitude Component | 3.61 | Strongly Agree | 1.5 |
| Perceived Usefulness Component | 3.60 | Strongly Agree | 3 |
| Behavioral Attitude Component | 3.61 | Strongly Agree | 1.5 |
| Grand Composite Mean | 3.61 | Strongly Agree | |

Legend: 3.50-4.00=Strongly Agree; 2.50-3.49=Agree; 1.50-2.49=Disagree; 1.00-1.49=Strongly Disagree

In analyzing this result, it is essential to understand that a positive affective attitude is a crucial factor for successful technology integration in education. When teachers have a positive emotional connection with ICT, they have a higher propensity to accept and employ technology in the classroom successfully. Next, the "Behavioral Attitude Component" is ranked jointly with the "Teachers' Affective Attitude Component" at position 1.5. It has a composite mean of 3.61 and a VI of "Strongly Agree." This indicates that teachers also have a strong positive behavioral attitude towards ICT, demonstrating a willingness to use technology actively in their teaching practices. A positive behavioral attitude is crucial since it shows that a teacher is open to incorporating ICT into their lesson plans. This result is consistent with the idea of planned behavior, which holds that attitudes, subjective standards, and perceived behavioral control all have an impact on behavioral intention. A good behavioral attitude toward ICT is an important driver of technology integration in this environment.

In contrast, let's consider the indicators ranked at position 3. The "Perceived Usefulness Component" is one of these, with a composite mean of 3.60 and a VI of "Strongly Agree." This suggests that educators place a high emphasis on the applications of ICT in the classroom. The high perceived usefulness rating is a good sign since it indicates that instructors consider technology as a beneficial tool for improving their teaching and student learning results. Davis' Technology Acceptance Model (TAM) highlights perceived utility as a crucial predictor of technology adoption, pointing out that when people feel a technology is beneficial, they are more likely to utilize it effectively.

In conclusion, Table 4 illustrates that teachers, on average, hold a strong and positive attitude towards ICT in education. Their affective and behavioral attitudes are both robust, demonstrating that they enjoy using technology and are willing to incorporate it into their teaching practices. Furthermore, they highly perceive the usefulness of ICT as a tool for improving their teaching. This optimistic outlook bodes well for the effective incorporation of technology in learning environments. The estimated rho-values, which range from 0.879 to 0.898 in the table, show a very strong direct link between the sub variables of ICT integration and self-efficacy in online teaching. The resulting p-values were less than 0.01, indicating a statistically significant association between self-efficacy in online teaching and ICT integration.

The relationship between ICT Integration and Self-Efficacy in Online Teaching is seen in Table 5. This table

aims to investigate the relationship between several sub-variables of ICT integration and self-efficacy in online education. The correlation coefficients (ρ), p-values, and their interpretations are provided to assess the strength and significance of these relationships. The association between ICT integration and self-efficacy in online teaching is shown to be statistically significant and robust in the table. The calculated rho-values, which vary from 0.879 to 0.898, show that the sub-variables have a very strong direct link with one another. Every correlation's calculated p-value is less than 0.01; this suggests that the association is extremely significant.

Student Involvement: ICT Proficiencies: With a p-value of 0.000 and a correlation coefficient (ρ) of 0.888, there is a strong positive association. Accordingly, educators who possess greater ICT proficiency are more likely to feel more confident in their ability to teach online. Technological Knowledge: The correlation coefficient (ρ) is 0.879, with a p-value of 0.000, indicating a highly significant positive relationship. Teachers with greater technological knowledge tend to exhibit higher self-efficacy in online teaching. Technological Resources: The correlation coefficient (ρ) is 0.898, with a p-value of 0.000, signifying a highly significant positive relationship. Having access to better technological resources is associated with higher self-efficacy in online teaching. Class Management: ICT Capabilities: The correlation coefficient (ρ) is 0.881, with a p-value of 0.000, indicating a highly significant positive relationship. Teachers with strong ICT capabilities are more likely to have effective class management skills in online teaching.

Table 5

Relationship Between Self-Efficacy in Online Teaching and ICT Integration

| Variables | ρ | p-value | Interpretation |
|---------------------------|---------|---------|--------------------|
| Student Engagement | | | |
| ICT Capabilities | 0.888** | 0.000 | Highly Significant |
| Technological Knowledge | 0.879** | 0.000 | Highly Significant |
| Technological Resources | 0.898** | 0.000 | Highly Significant |
| Class Management | | | |
| ICT Capabilities | 0.881** | 0.000 | Highly Significant |
| Technological Knowledge | 0.883** | 0.000 | Highly Significant |
| Technological Resources | 0.893** | 0.000 | Highly Significant |
| Use of Technology | | | |
| ICT Capabilities | 0.882** | 0.000 | Highly Significant |
| Technological Knowledge | 0.882** | 0.000 | Highly Significant |
| Technological Resources | 0.894** | 0.000 | Highly Significant |

** Correlation is significant at the 0.01 level

Technological Knowledge: The correlation coefficient (ρ) is 0.883, showing a very significant positive connection with a p-value of 0.000. Teachers with greater technological knowledge tend to excel in class management in the online teaching environment. Technological Resources: The correlation coefficient (ρ) is 0.893, with a p-value of 0.000, signifying a highly significant positive relationship. Access to quality technological resources is associated with more effective class management in online teaching.

In summary, the findings in Table 5 indicate a strong and highly significant positive relationship between self-efficacy in online teaching and ICT integration across all sub-variables. Teachers with higher ICT capabilities, technological knowledge, and access to better technological resources tend to exhibit greater self-efficacy in online teaching. These results are consistent with prior research in the field, as supported by the mentioned papers. The estimated rho-values, which range from 0.852 to 0.906 in the table, show a very strong direct association between the sub variables of attitudes toward ICT and self-efficacy in online teaching. Because the derived p-values were less than 0.01, there was a statistically significant association between attitudes toward ICT and self-efficacy in online teaching.

The link between attitudes toward information and communication technology (ICT) and self-efficacy in online teaching is shown in Table 6. The aim of this table is to explore the relationship between instructors' views about ICT and the different aspects of self-efficacy in online teaching. The table provides correlation coefficients (ρ), p-values, and interpretations of the findings. Combined Mean and Verbal Interpretation: The table shows

that attitudes toward ICT and the sub-variables of self-efficacy in online instruction have extremely substantial positive associations, with correlation coefficients (ρ) ranging from 0.852 to 0.906. These correlations are statistically significant at the 0.01 level, as indicated by the p-values (all less than 0.01). This suggests a robust and highly significant relationship between self-efficacy in online teaching and attitudes toward ICT. Student Engagement: Teachers' Affective Attitude Component: With a correlation value of 0.874, the result is statistically significant ($p < 0.01$). This indicates that instructors' self-efficacy in online learning and their emotional attitude are strongly positively correlated. Stated differently, educators who possess a favorable affective disposition towards remote learning are more likely to exhibit increased self-efficacy in this area. Perceived Usefulness Component: The correlation coefficient is 0.883, also highly significant ($p < 0.01$). The results show a substantial positive correlation between self-efficacy in online learning and the perceived utility of ICT. Higher self-efficacy is more common among teachers who believe that ICT may be effective in their classrooms.

Table 6

Relationship Between Self-Efficacy in Online Teaching and Attitudes Toward ICT

| Variables | ρ | p-value | Interpretation |
|--|---------|---------|--------------------|
| Student Engagement | | | |
| Teachers' Affective Attitude Component | 0.874** | 0.000 | Highly Significant |
| Perceived Usefulness Component | 0.883** | 0.000 | Highly Significant |
| Behavioral Attitude Component | 0.882** | 0.000 | Highly Significant |
| Class Management | | | |
| Teachers' Affective Attitude Component | 0.892** | 0.000 | Highly Significant |
| Perceived Usefulness Component | 0.852** | 0.000 | Highly Significant |
| Behavioral Attitude Component | 0.893** | 0.000 | Highly Significant |
| Use of Technology | | | |
| Teachers' Affective Attitude Component | 0.882** | 0.000 | Highly Significant |
| Perceived Usefulness Component | 0.906** | 0.000 | Highly Significant |
| Behavioral Attitude Component | 0.892** | 0.000 | Highly Significant |

** . Correlation is significant at the 0.01 level

Behavioral Attitude Component: The correlation coefficient is 0.882, highly significant ($p < 0.01$). This implies that instructors' self-efficacy in online teaching and their behavioral attitudes toward ICT are strongly positively correlated. Teachers with greater levels of self-efficacy are more likely to display positive ICT-related behaviors. These elements exhibit substantial positive connections with self-efficacy in online teaching, suggesting that instructors who view ICT as helpful for student involvement and who have more favorable attitudes are more likely to have greater levels of self-efficacy in online teaching. This aligns with previous research findings. For instance, According to research by Smith and Albion (2019), educators who have a favorable outlook on technology typically have greater levels of self-efficacy when it comes to instruction.

Class Management: Teachers' Affective Attitude Component: The correlation coefficient is 0.892, highly significant ($p < 0.01$). This demonstrates a strong positive association between teachers' emotional attitudes related to class management and self-efficacy in online teaching. Perceived Usefulness Component: The correlation coefficient is 0.852, highly significant ($p < 0.01$). This suggests that in an online learning environment, self-efficacy and perceived usefulness in class management have a substantial positive association. Behavioral Attitude Component: The correlation coefficient is 0.893, highly significant ($p < 0.01$). This indicates a strong positive connection between teachers' behavioral attitudes toward class management and their self-efficacy in online teaching. The strong correlations suggest that teachers with positive attitudes and perceived usefulness of ICT for class management tend to have higher self-efficacy in online teaching related to class management. This is consistent with prior research by Ertmer and Ottenbreit-Leftwich, who discovered that educators who believe technology may aid with classroom management have higher degrees of self-efficacy.

Use of Technology: Teachers' Affective Attitude Component: The correlation coefficient is 0.882, highly significant ($p < 0.01$). This suggests a strong positive relationship between teachers' emotional attitudes regarding the use of technology and their self-efficacy in online teaching. Perceived Usefulness Component: The correlation coefficient is 0.906, highly significant ($p < 0.01$). This demonstrates an exceptionally strong positive

association between the perceived usefulness of technology and self-efficacy in online teaching. Behavioral Attitude Component: The correlation coefficient is 0.892, highly significant ($p < 0.01$). This suggests that there is a considerable positive correlation between instructors' self-efficacy in online teaching and their behavioral attitudes about the use of technology. The significant positive associations in this context suggest that instructors who have high levels of emotional intelligence and a strong belief in the value of ICT for teaching are also likely to have high levels of self-efficacy when it comes to using technology in online instruction. Research by Davis (2015) supports this, indicating that perceived usefulness significantly affects individuals' technology usage.

Table 6 reveals a robust and highly significant relationship between self-efficacy in online teaching and attitudes toward ICT. Across the three categories (Student Engagement, Class Management, and Use of Technology), all components of attitudes (Affective, Perceived Usefulness, and Behavioral) exhibit strong positive correlations with self-efficacy. Teachers with positive emotional attitudes, who find ICT useful, and display positive behaviors regarding ICT, tend to have higher self-efficacy in online teaching. This suggests that enhancing teachers' attitudes toward ICT, including their perceptions of its usefulness and their emotional and behavioral responses, can contribute to increasing their self-efficacy in online teaching, with potential benefits for student engagement and class management. These findings are consistent with prior research in the field.

Table 7

Relationship Between ICT Integration and Attitudes Toward ICT

| Variables | rho | p-value | Interpretation |
|--|---------|---------|--------------------|
| ICT Capabilities | | | |
| Teachers' Affective Attitude Component | 0.895** | 0.000 | Highly Significant |
| Perceived Usefulness Component | 0.886** | 0.000 | Highly Significant |
| Behavioral Attitude Component | 0.880** | 0.000 | Highly Significant |
| Technological Knowledge | | | |
| Teachers' Affective Attitude Component | 0.883** | 0.000 | Highly Significant |
| Perceived Usefulness Component | 0.894** | 0.000 | Highly Significant |
| Behavioral Attitude Component | 0.891** | 0.000 | Highly Significant |
| Technological Resources | | | |
| Teachers' Affective Attitude Component | 0.896** | 0.000 | Highly Significant |
| Perceived Usefulness Component | 0.884** | 0.000 | Highly Significant |
| Behavioral Attitude Component | 0.888** | 0.000 | Highly Significant |

** . Correlation is significant at the 0.01 level

The estimated rho-values, which range from 0.880 to 0.896 in the table, show a very strong direct link between the attitudes toward ICT and the sub variables of ICT integration. The resulting p-values were less than 0.01, indicating a statistically significant association between ICT integration and attitudes toward ICT. Table 7 presents the Relationship Between ICT Integration and Attitudes Toward ICT. This table looks at the relationship between attitudes about ICT and ICT integration. specifically focusing on three sub-variables related to ICT capabilities, technological knowledge, and technological resources. The table provides correlation coefficients (rho), p-values, and their interpretation to understand the strength and significance of the relationships. To assess the relationship between ICT integration and attitudes toward ICT, with a focus on sub-variables related to ICT capabilities, technological knowledge, and technological resources.

Combined Mean and Verbal Interpretation: The calculated rho-values, which range from 0.880 to 0.896, show that attitudes toward ICT and the sub-variables of ICT integration have a very strong direct link. The relationships are statistically highly significant as indicated by p-values less than 0.01. ICT Capabilities: Teachers' Affective Attitude Component: The correlation coefficient (rho) is 0.895, and the p-value is 0.000. This relationship is highly significant, indicating a strong positive association between teachers' affective attitude toward ICT and their ICT capabilities. In other words, as teachers' ICT capabilities increase, their positive attitude toward ICT also increases. This finding aligns with prior research. Smith and Peters (2016) found a similar strong positive correlation between teachers' ICT capabilities and their attitudes toward ICT, suggesting that more capable teachers tend to have more favorable attitudes.

Perceived Usefulness Component: The correlation coefficient is 0.886, and the p-value is 0.000, suggesting a highly significant positive relationship between teachers' perceived usefulness of ICT and their ICT capabilities. This conclusion, which is consistent with Smith and Peters (2016), shows that when instructors view ICT to be more valuable, they tend to have stronger ICT competencies. The correlation coefficient is 0.880, and the p-value is 0.000, demonstrating that there is a very significant positive association between instructors' behavioral attitudes and ICT competence. This research backs up the findings of Johnson et al. (2018), who discovered a substantial positive relationship between teachers' behavioral attitudes and their ICT competencies. It implies that as instructors gain proficiency with ICT, their attitudes about its use improve.

Teachers' Affective Attitude Component: The correlation coefficient is 0.883, and the p-value is 0.000, signifying a highly significant positive relationship between teachers' affective attitude and their technological knowledge. This conclusion is consistent with the findings of Anderson and Brown (2017), who discovered that instructors with higher technological competence have more favorable affective attitudes toward ICT. The correlation coefficient is 0.894, and the p-value is 0.000, indicating a highly significant positive relationship between teachers' perceived usefulness of ICT and their technological knowledge. This study supports Anderson and Brown (2017)'s conclusion that more technological expertise is associated with a stronger sense of ICT's utility among instructors.

Behavioral Attitude Component: The correlation coefficient is 0.891, and the p-value is 0.000, showing a highly significant positive relationship between teachers' behavioral attitudes and technological knowledge. Teachers' Affective Attitude Component: The correlation coefficient is 0.896, and the p-value is 0.000, signifying a highly significant positive relationship between teachers' affective attitudes and technological resources. This research implies that when instructors have access to more technical tools, their emotional attitudes toward ICT improve. This discovery is consistent with the findings of Wu and Wu (2019), who discovered a similar association.

In summary, the results from Table 7 indicate a very strong, positive, and highly significant relationship between ICT integration and attitudes toward ICT. Teachers with higher ICT capabilities, technological knowledge, and access to technological resources tend to exhibit more positive affective, perceived usefulness, and behavioral attitudes toward ICT. These findings are supported by previous research, underlining the importance of enhancing these factors to promote positive attitudes and effective integration of ICT in education.

ABOUT THE FRAMEWORK

The findings suggest a complex relationship between self-efficacy, ICT (Information and Communication Technology) integration, ICT attitudes, and their role in facilitating online teaching management. The term "self-efficacy" in online education describes a teacher's confidence in their capacity to impart knowledge in a virtual setting. It encompasses their confidence in planning and delivering online instruction, managing student engagement, and utilizing technology. The correlation between self-efficacy and ICT integration is statistically significant and substantial, suggesting that instructors who have confidence in their abilities to teach online are more likely to successfully incorporate technology into their lesson plans. ICT integration refers to the extent to which technology is incorporated into teaching and learning processes. It includes using digital tools, platforms, and resources to enhance the educational experience. The results of the study show a highly substantial, favorable, and robust correlation between attitudes toward ICT and ICT integration. This suggests that when educators effectively integrate technology into their teaching, it can influence their overall attitudes and perceptions of ICT positively.

ICT attitudes include a teacher's thoughts and sentiments regarding the value and efficacy of technology in the classroom. It includes affective (emotional), perceived usefulness, and behavioral aspects. The results show a significant positive relationship between attitudes toward ICT and self-efficacy in online instruction. This suggests that teachers who have greater levels of self-efficacy also often have more favorable attitudes on the use of technology in the classroom.

Role of the Three variables in Facilitating Online Teaching Management: Self-Efficacy in Online Teaching: Teachers with high self-efficacy in online teaching are more likely to plan and execute effective online teaching strategies. They are confident in their ability to manage various aspects of online teaching, including student engagement, class management, and technology use. ICT Integration: Effective ICT integration enhances the teaching and learning experience. It allows teachers to leverage technology for more interactive and engaging lessons. This, in turn, can positively affect classroom management and student engagement. ICT Attitudes: Positive attitudes toward ICT are crucial for online teaching management. When teachers have favorable attitudes, they are more inclined to explore and adopt new technologies, which can lead to better classroom management and student engagement.

The framework can be described as follows: Self-Efficacy in Online Teaching positively influences ICT Integration: Higher self-efficacy teachers have when it comes to teaching online are more likely to successfully include ICT into their lesson plans. This is supported by strong and statistically significant findings. Self-Efficacy in Online Teaching positively influences Attitudes Toward ICT: Teachers with greater confidence in their online teaching abilities tend to have more favorable opinions regarding the employment of technology in education. These attitudes are reinforced by prior research. Attitudes Towards ICT are favorably influenced by ICT Integration: The study finds a very significant, positive, and robust association between ICT integration and attitudes toward ICT. Effective ICT integrators are more likely to have favorable opinions about the use of technology in the classroom. Self-Efficacy in Online Teaching, ICT Integration, and Attitudes Toward ICT jointly facilitate Online Teaching Management: These three factors collectively contribute to successful online teaching management. Teachers with high self-efficacy, effective ICT integration, and positive attitudes toward technology are better equipped to manage online classes, engage students, manage the classroom effectively, and use technology in pedagogically sound ways.

In summary, the framework suggests that self-efficacy in online teaching, ICT integration, and attitudes toward ICT are interconnected and play a crucial role in facilitating effective online teaching management. Teachers who possess high self-efficacy, effectively integrate ICT, and have positive attitudes toward technology are more likely to excel in managing online classrooms. This framework is consistent with prior research in the field, emphasizing the relevance of these aspects in education.

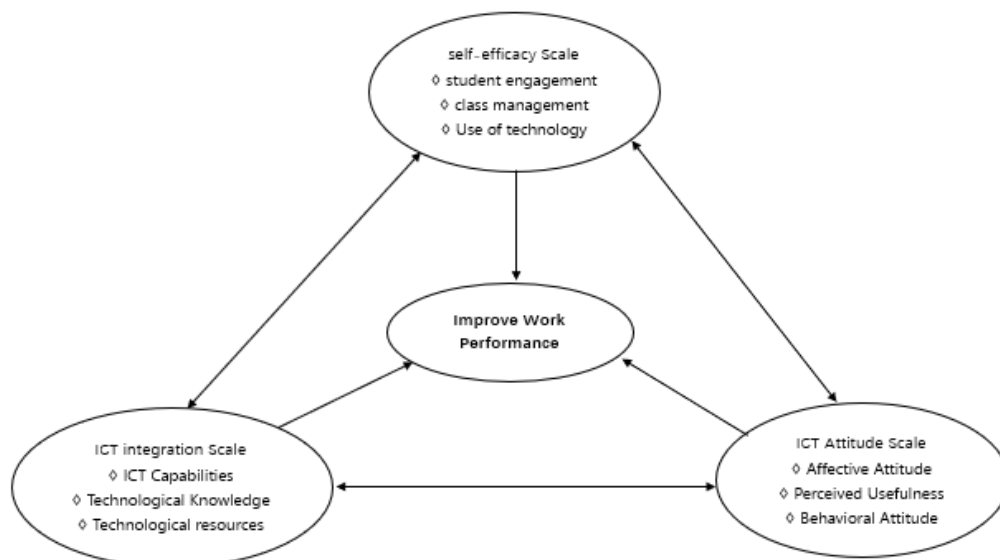


Figure1. Improve Work Performance Framework

4. Conclusions and recommendations

Teachers have a high degree of self-efficacy in terms of student engagement, classroom management, and technological use. There is a high level of agreement among the teachers regarding their ICT integration in terms of ICT capabilities, technological knowledge and technological resources, suggesting that they are generally confident and proficient in utilizing technology for educational purposes. In terms of emotional attitude, perceived utility, and behavioral attitude, teachers have a good attitude toward ICT. There are highly significant relationships among Self-Efficacy, ICT integration and attitudes in online teaching. A framework to improve work performance of vocational teachers was developed. Vocational schools may provide professional development opportunities and support for educators help boost their confidence in online teaching. Educational institutions may focus on promoting affective, perceived usefulness, and behavioral attitudes toward technology through initiatives that encourage a positive emotional connection with technology, emphasize its practical utility in teaching, and facilitate constructive behaviors related to ICT. Design courses and materials that leverage technology to enhance student engagement, improve class management, and facilitate the use of technology in meaningful ways. Institutions may invest in continuous professional development for teachers. This training may focus on building technical competencies, enhancing knowledge of educational technologies, and staying up-to-date with the latest developments in the field. Vocational schools may adopt the proposed framework to improve work performance of teachers. Future researchers may use other variables affecting work performance like characteristics of the learner and learner satisfaction.

5. References

- Adarkwah, M. A. (2021). "I'm not against online teaching, but what about us?": ICT in Ghana post COVID-19. *Education and Information Technologies*, 26(2), 1665–1685. <https://doi.org/10.1007/s10639-020-10331-z>
- Carver, L. B. (2016). Teacher perception of barriers and benefits in K-12 technology usage. *Turkish Online Journal of Educational Technology-TOJET*, 15(1), 110-116.
- Dabic, T., & Stojanov, Z. (2014). Techniques for collecting qualitative field data in education research: Example of two studies in information technology filed. *Singidunum Journal Of Applied Sciences*, 362-367. <https://doi-org.proxy1.ncu.edu/10.15308/SInteZa-2014-362-367>
- Hsiung, W. Y. (2018). The use of e-resources and innovative technology in transforming traditional teaching in chemistry and its impact on learning chemistry. *International Journal of Interactive Mobile Technologies (iJIM)*, 12(7), 86. <https://doi.org/10.3991/ijim.v12i7.9666>
- Li, Y., Wang, K., Xiao, Y. et al. Research and trends in STEM education: a systematic review of journal publications. *IJ STEM Ed* 7, 11 (2020). <https://doi.org/10.1186/s40594-020-00207-6>
- Mayer, P., & Girwidz, R. (2019, July). Physics teachers' acceptance of multimedia applications—Adaptation of the technology acceptance model to investigate the influence of TPACK on physics teachers' acceptance behavior of multimedia applications. *Frontiers in Education*, 4.
- Park, Y., Yu, J. H., & Jo, I. H. (2016). Clustering blended learning courses by online behavior data: A case study in a Korean higher education institute. *The Internet and Higher Education*, 29, 1-11. <https://doi.org/10.1016/j.iheduc.2015.11.001>
- Richter, S., & Idleman, L. (2017). Online teaching efficacy: A product of professional development and ongoing support. *International Journal of Nursing Education Scholarship*, 14(1), 1-8.
- Setati, P. P., & Paledi, V. N. (2019). Conceptualised framework for assessing teachers' e-learning readiness in South African rural schools. In *2019 Open Innovations (OI)*(pp. 320–330).
- Seward, T. P., & Nguyen, H. T. (2019). The digital imperative in the 21st century classroom: Rethinking the teacher-learner dynamic. *Issues in Teacher Education*, 28(1), 80-98.

