JOURNAL OF HIGHER EDUCATION RESEARCH DISCIPLINES

VOLUME 7, ISSUE 1, JANUARY - DECEMBER 2022

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-Conceptual Framework
-Research Methodology
-Results and Discussion
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A paper is required to meet the following guidelines:

-Intellectual Value
-Essential Impacts and Originality
-Critical Quality

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IMPACT OF CLOUD COMPUTING ON THE TEACHING COMPETENCE AMONG INFORMATION TECHNOLOGY (IT) FACULTY AT ILOILO STATE COLLEGE OF FISHERIES (ISCOF) SYSTEM IN THE PHILIPPINES

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Volume 7, Issue No.1, January - December 2022

Abstract

Cloud computing (CC) has revolutionized the way people use technology, and its impact is also felt in education. Cloud computing has radically changed education by providing educators with new teaching and learning methods. This study was conducted to determine the impact of cloud computing on the teaching competence among the Information Technology (IT) Faculty in the Iloilo State College of Fisheries (ISCOF) System in the Philippines. Eighty (80) IT Faculty members were participants in the study. A quantitative research approach was used in the study. Data collection was done through panel-approved questionnaires. The means, standard deviations, frequency counts, and percentage analysis were utilized to analyze the descriptive data. T-test and Analysis of Variance (ANOVA) were used for inferential statistics with an alpha level of 0.05. The findings revealed that utilization of cloud computing had a high impact on the teaching competency of eighty (80) IT Faculty in the ISCOF System when classified to highest educational attainment, the number of years in teaching, and the latest PES rating. The researcher suggested that training regarding cloud computing should be not only for IT Faculty members but also for the institution's non-IT Faculty, traditional teachers, and non-teaching staff based on the national competency standard.

Keywords and Phrases:

Cloud Computing, teaching competence, educational system, higher education

1.0 Introduction

In this digital age, technology is an inseparable part of our lives. It has infiltrated every sector, including education. Technology-assisted learning, particularly cloud computing (CC) technologies, have become one of the most popular forms of instruction, and for a good reason. These tools and services have proven more effective than traditional instruction (Gupta et al., 2021).). Cloud computing (CC) is the process of

using a remote server to store, manage, and process data (Yu, 2021), having its core value being the management of information (Rico-Bautista et al., 2021). This can include everything from individual files to entire businesses and institutional applications (Asadi, 2020). Cloud computing offers significant benefits to educational institutions, including enhanced security, improved storage capacity, and reduced costs (Salindeho et al., 2021). Parchure (2020) argued that cloud computing had become an "asset" in the teaching-learning process. Cloud computing has the potential to revolutionize education by providing an excellent platform for teachers to improve their teaching practices and productivity (Agrawal, 2020).The use of cloud computing in education provides many benefits for students and educators (Al-Ammary, 2021). A study showed that the introduction of cloud computing in education improved training content and improved students' academic results (Wu et al., 2021). Among educators, studies revealed that self-assessment of using cloud computing to develop self-learning teaching competencies among faculty members is of a high level (Alanazy, 2021). Cloud technology solutions have also been found to significantly improve the sustainability and efficiency of research and development and the quality of teaching and learning in educational institutions (Al-Rasheedi & Khan, 2021). Moreover, the application of cloud educational technologies to enhance teaching competencies proved to have solved the problem of interaction with the teaching staff and the learning environment (Mosenkis et al., 2020).

The adaptability of cloud computing among state universities and colleges in the Philippines has been growing, especially during the recent global pandemic (Ocampo, 2022). Cloud computing provides an excellent avenue for the entire academic community to be productive and efficient, including students, professors, staff, and other stakeholders (Alimboyong & Bucjan, 2021). However, the adoption and operations of cloud computing technologies in the education sector are still slower compared to other sectors (Joaquin et al., 2020; Barrot et al., 2021; Kulkarni, 2021).

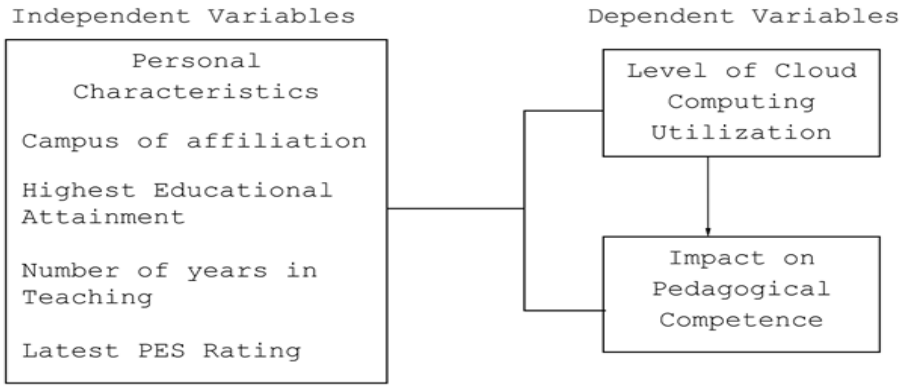
After having these observations, the researcher has been challenged to study the level of cloud computing utilization among faculty members who are teaching information technology subjects in public higher education institutions and its impact on their teaching competence. This study sought to determine the impact of cloud computing on the teaching competence among the Information Technology (IT) Faculty in the Iloilo State College of Fisheries (ISCOF) System in the

Philippines.

2.0 Conceptual Framework

The conceptual framework, as shown in the schematic diagram below, guides the study. First, the level of cloud computing utilization and the pedagogical competence among IT faculty in the ISCOF System when taken as an entire group and further classified into campus affiliation, highest educational attainment, the number of years in teaching, and the latest PES rating were determined. Then, any significant differences in the level of cloud computing utilization and the pedagogical competence among IT faculty in the ISCOF System when taken as an entire group and further classified into campus affiliation, highest educational attainment, the number of years in teaching, and the latest PES rating were determined. Lastly, any significant relationship between the level of cloud computing utilization and the pedagogical competence amount IT faculty was determined. This study was anchored on three learning theories which include the Behaviorism Theory of Learning, Information Processing Theory, and Constructivism Learning Theory. Behaviorism Theory of Learning is based on the idea that "all behaviors are learned through interaction with the environment" (Western Governors University, 2020). Information Processing Theory is an approach to cognitive development studies that aims to "explain how information is encoded into memory" (Wang et al., 2003). Moreover, Constructivism Learning Theory is founded upon the idea that "people actively construct or make their own knowledge, and that reality is determined by your experiences as a learner." (Western Governors University, 2020).

Figure. 1 The schematic diagram used in this study.



3.0 Research Methodology

3.1 Research Design

This study used a descriptive survey design. A descriptive survey allowed for the collection of data in order to test hypotheses or answer questions regarding the state of the subject of study (Gay, 1987). This study describes the level of cloud computing utilization and the pedagogical competence among IT faculty in the ISCOF System when taken as an entire group and then further classified into campus affiliation, highest educational attainment, the number of years in teaching, and the latest PES rating. Statistical tools used to measure the variables included (1) Percentage, which was used to determine different categories under each item in the respondents' profile, (2) Frequency count, which was used to determine the number of respondents used in the study, (3) Mean, used to determine the items in the respondents' profile, (4) t-test, which was used find out if there were significant differences in the level of cloud computing utilization and the pedagogical competence among IT faculty in the ISCOF System when classified as to campus of affiliation and number of years in teaching, and (5) ANOVA, used to determine the significant differences in the level of cloud computing utilization and the pedagogical competence among IT faculty in the ISCOF System when classified as to highest educational attainment and Performance Evaluation Sheet (PES). An alpha level of 0.05 was used for inferential statistics. To interpret the scores, the following scales with the corresponding description were utilized:

A. Level of Utilization of Cloud Computing

Scale Means	Description
4.20 – 5.00	Very High
3.40 - 4.19	High
2.60 - 3.39	Good
1.80 - 2.59	Fair
1.00 - 1.79	Poor

B. For Pedagogical Competence among IT Faculty

Scale Means	Description
4.20 – 5.00	Very High
3.40 - 4.19	High
2.60 - 3.39	Good
1.80 - 2.59	Fair
1.00 - 1.79	Poor

3.2 Questionnaire Development

The researcher constructed the questionnaire to be used as an instrument for the study. This questionnaire was divided into two parts. The first part dealt with the respondents' profiles which included the following name of Faculty,

highest educational attainment, number of years in teaching, and latest (Performance Evaluation Sheet) PES Rating. The second part dealt with the general knowledge/ perception about cloud computing, teaching competence using cloud computing, and the impact of cloud computing in teaching. The instrument was validated for structure and content by the panel of jurors composed of experts in Educational Technology. A letter addressed to the selected validators, signed by the researcher's Adviser and Dean of the College was sent to the individual jurors who subsequently responded affirmatively. After validation, the instruments were distributed among the eighty (80) IT Faculty members of the ISCOF System that served as the study's respondents.

3.3 Sample Selection

The selection of respondents was based on the inclusion criteria in Table 1. Table 1 presents the respondents' profile in terms of (a) the highest educational attainment, (b) the number of years in teaching, and (c) the latest PES rating. The study's respondents were eighty (80) IT Faculty members of the ISCOF System. The actual sample size of the study was the total population. When IT faculty were categorized as Main and External Campuses it was found that there were 22 Faculty or 27.5% from the Main Campus and 58 Faculty or 72.5% from External Campus. In terms of their highest educational attainment, 12 or 15% were bachelor's degrees; 61 or 76.25% were master's degrees, and 7 or 8.75% were doctorate degree holders. When IT Faculty were grouped as to the number of years in teaching, results showed that 37 or 46.25% were 10 years and above while 43 or 53.75% were 11 years and above. Based on their latest Performance Evaluation System (PES) rating, it was found out that 7, or 8.75% were outstanding; 62, or 77.5 were very satisfactory; 8, or 10% were satisfactory; 3, or 3.75% have fair performance.

Table 1. The profile of the respondents

Category	Frequency(f)	Percentage (%)
Entire Group	80	100
Campus		
Main Campus	22	27.50%
External Campus	58	72.50%
Highest Educational Attainment		
Bachelor's Degree	12	15.00%
Master's Degree	61	76.25%
Doctorate Degree	7	8.75%
Number of Years in Teaching		
10 yrs & below	36	45.00%
11 yrs & above	44	55.00%
Latest PES Rating		
Outstanding	7	8.75%
Very Satisfactory	62	77.50%
Satisfactory	8	10.00%
Fair	3	3.75%

3.4 Data Collection, Validity, and reliability

Initially, the researcher secured a recommendation letter and approval from the ISCOF System President to conduct the study. Next, the researcher visited the school's campuses and arranged convenient days for data collection. The researcher introduced the use of cloud computing via Google applications. A uniform resource locator (URL) was given to the respondents in order for them to access the Google forms where they could key in their answers. The respondents answered the questionnaire and returned it with their answers by clicking the Submit button, allowing the researcher to have immediate access.

The numerical value was subjected to the appropriate computer-processed descriptive and inferential statistics. The following statistical tools were used in analyzing the data: percentage, frequency count, mean, t-Test, and Analysis of Variance (ANOVA). An alpha level of 0.05 was

used for inferential statistics. A scale with the corresponding description was used to interpret the scores. The level of utilization of cloud computing: 1.00-1.79 (Poor), 1.80-2.59 (Fair), 2.60-3.39 (Good), 3.40-4.19 (High), and 4.20-5.00 (Very High). For the teaching competency among IT Faculty members: 1.00-1.79 (Poor), 1.80-2.59 (Fair), 2.60-3.39 (Good), 3.40-4.19 (High), and 4.20-5.00 (Very High).

4. Results and Discussion

4.1 Descriptive Data Analysis

4.1.1 Level of Cloud Computing Utilization

The members of the IT Faculty's level of satisfaction in using cloud computing is described as "Very High," with a mean of 4.38. The result indicated that IT faculty members of the ISCOF System used cloud computing very highly, particularly in sending emails and creating documents, slides, and forms. The result further indicated that IT faculty members in the ISCOF System were using cloud computing in managing their files and classroom instruction. The present finding conforms to the notion that virtualization in cloud computing eliminates the need and cost of expensive hardware, offers easy accessibility and mobility, and virtualized data in the cloud offers more collaboration (DSM Technology, 2022). When classified as the highest educational attainment, the result revealed that IT Faculty members have "very high" utilization of cloud computing as indicated in the following means: Bachelor's degree (4.55), Master's degree (4.44), and Doctorate (4.33). When classified as the number of years in teaching, IT Faculty members showed a "Very High" level of cloud computing utilization indicated by a mean of 4.43 for those teaching ten (10) years and below and 4.45 for those teaching ten (10) years and above. When the respondents were classified to the latest performance evaluation system rating, the result revealed that IT faculty members with a descriptive rating of "Outstanding," "Very Satisfactory," and "Satisfactory" had a "Very High" level of cloud computing utilization indicated by a mean ranging from 4.20-5.00. In addition, IT faculty members with a "Fair" rating had a "High" cloud computing utilization with a mean of 3.51. The present finding aligns with the idea that cloud computing fosters opportunities for teachers to connect with their students to multiple programs and applications, allowing students to be innovative in their presentation of mastery of standards (Vadis, 2019). Moreover, results revealed that an already good number of IT faculty have been exposed to and have been using cloud computing due to its accessibility and design for collaborative

input (Vaisanen, 2019).

4.1.2 Level of Teaching Competence

The respondents' teaching competence level is described as "Very High," with a mean rating of 4.38, which implies that IT faculty members in the ISCOF System teach cloud computing at a very high level, particularly in sending emails and creating documents, slides, and forms. The result further indicated that IT faculty members in the ISCOF System were highly competent in using cloud computing to manage their files and classroom instructions. When the respondents were grouped as to highest educational attainment, IT Faculty members with Bachelor's and Master's degrees had a "very high" utilization of cloud computing with a mean ranging from 4.20 to 5.00. At the same time, those with a Doctorate were described as having a "High" level of teaching competence. When mean values were taken into account, it was noted that those with a Bachelor's degree were highly competent, having a mean of 4.60 compared to their counterparts. The present finding conforms to the study of Reese (2009) that cloud computing applications and services can be used in education. This also highlights the level of adoption and classroom utilization and some aspects of the distinctiveness of cloud computing. When classified to the number of years in teaching, results showed a "Very High" level of teaching competence indicated by a mean of 4.55 for those who had been teaching ten (10) years and below and a mean of 4.34 for those teaching for eleven (11) years and above. Results revealed that educator pedagogies were the highest predictors of the use of computers in the classroom. This conforms to the study of Visvanathan (2010) who conducted a predictive study on secondary schools to examine the educator's pedagogy influencing the effective use of computers for teaching purposes in classrooms regardless of their teaching experience. When the respondents were classified as to the latest performance evaluation system rating, the result revealed that IT faculty members with a descriptive rating of "Outstanding," Very Satisfactory," and "Satisfactory" had a "Very High" level of cloud computing utilization indicated in the mean ranging from 4.20-5.00. IT faculty members with "Fair" ratings had a very high level of teaching competence with a mean of 4.37. This conforms to the study of Yadav (2014) which emphasized the impact of cloud computing on the education system and how to provide quality education by using virtualization.

4.2 Inferential Analysis

4.2.1 Cloud Computing Utilization among IT Faculty when classified as to Campus of Affiliation and Number of Years in Teaching

The t-test for independent samples was used to determine the significant differences in the utilization level of cloud computing among IT Faculty when classified as to campus affiliation and number of years in teaching. In terms of campus affiliation, the analysis revealed that the mean among IT Faculty in the Main Campus (M=4.58, SD=.423) and External Campus (M=4.39, SD=.677) in cloud computing utilization were t-value of 1.66 with a p-value of 0.043, which is less than the alpha level of 0.05. The result implied a significant difference in cloud computing utilization among IT Faculty on the Main and External campuses. The present finding of the study supports that study conducted by Banini and Boakye (2008) which argued that despite the limited use of computers by teachers in their teaching, many agree that the computer has changed the way students learn. Murali (2019) also posited that the majority of the ICT faculty members have an adequate attitude towards ICT at the same time there is a significant difference among the respondents by gender, education, and living area in this regard. In the number of years of teaching, the t-value of .124 with a p-value of 0.527 is greater than the 0.05 alpha level of significance. This result implies that there is no significant difference in cloud computing utilization among IT Faculty members. The result is coherent with the study of Lau and Sim (2008) in which the majority of ICT faculty members have a positive attitude towards further integration of technology into classroom instruction.

4.2.2 Cloud Computing Utilization among IT Faculty when classified as to Highest Educational Attainment and Latest PES Rating

The significant difference in the level of cloud computing utilization when classified as to highest educational attainment and the latest PES rating was determined using ANOVA. On the one hand, in terms of highest educational attainment, the computer-processed ANOVA revealed that when IT Faculty were classified as having the highest educational attainment – no significant differences were noted, t (80) = p (.228) > .05. Result conformed to the result of the study of Alfailakawi (2021) in which there were no statistically significant differences due to the effect of gender and scientific rank on the value of this technology. On the other hand, the computer processed ANOVA revealed that when IT Faculty were classified as to Performance Evalua-

tion System (PES), a significant difference was noted, t (80) = p (.148) > .05. The present finding supports the idea presented by Fakultesi et al. (2009) which argued that most of the participants expressed positive perceptions about the integration of ICT into teacher education programs. They use the Internet as a supportive tool for their courses, particularly search engines used by them. In addition, results show similarity to the findings of Musungwini et al. (2016) indicating there was a knowledge gap and that there was the need to conduct workshops to try and enlighten the faculty members.

4.2.3 Teaching Competence among IT Faculty when classified as to Campus of Affiliation and Number of Years in Teaching

The t-test for the independent sample was used to determine the significant differences in the level of teaching competence among IT Faculty when classified as the campus of affiliation and number of years in teaching. The result showed a t-value of 1.64 with a p-value of 0.167, which is greater than the alpha level of 0.05. This result implies no significant difference in teaching competence among IT Faculty on the Main and External campuses. When IT Faculty were classified as to the number of years in teaching, a t-test for the independent sample was used to determine the significant difference in the level of teaching competence. The t-value of .718 with a p-value of 0.064 is greater than the 0.05 alpha significance level. This result implies that there is no significant difference in the level of cloud computing utilization among IT Faculty. The present finding conforms to the study of Jamieson-Proctor et al. (2008) wherein no significant relationship between years of teaching experience and teacher confidence but the experience did impact the level of ICT use that teachers prefer their students to demonstrate, with teachers who have had least experience preferring their students to use ICT more to both enhance and transform the curriculum were found. In addition, Graham et al. (2020) explained that there was no evidence of lower teaching quality for beginning teachers (0–3 years of experience), but some evidence of a decline in teaching quality for teachers with 4–5 years of experience.

4.2.4 Teaching Competence among IT Faculty when classified as to Highest Educational Attainment and Latest PES Rating

ANOVA was used to determine the significant difference when classified as highest educational attainment and latest PES rating. When the respondents were classified as to their highest educational

attainment and latest PES rating. When the respondents were classified as to their highest educational attainment, results showed that the t(80)= p (.146), which is greater than the 0.05 alpha significance level, revealed a significant difference in the level of teaching competence among IT Faculty. Results conformed to the findings of Ololube (2006) there are significant differences in the effectiveness between professionally trained teachers and untrained teachers in their ICT instructional material utilization competencies. When the respondents were classified as to their latest Performance Evaluation System (PES), the results of the analysis revealed a significant difference t (80) = p (.346), which is greater than .05. The results showed that teacher competence and commitment had a significantly positive effect on the performance of professional teachers (Siri et al., 2020). Moreover, findings from regression analyses show that information and communication technologies (ICT) tools, particularly digital teacher competence and teacher education opportunities to learn digital competence, are instrumental in adapting to online teaching during COVID-19 school closures (Konig, 2020).

5. Conclusions

Based on the findings of the study, the following conclusion were drawn: (1) There is a "very high" level of cloud computing utilization among IT Faculty when classified as to campus of affiliation; highest educational attainment; number of years in teaching; and latest PES rating; (2) The level on the teaching competence among IT Faculty when classified as the highest educational attainment; number of years in teaching; and latest PES rating were described as "very high"; (3) No significant difference existed in the level cloud computing utilization among IT Faculty when classified as to campus of affiliation; highest educational attainment; number of years in teaching; and latest PES rating; (4) No significant difference was noted in the level of teaching competence among IT Faculty when classified as to campus affiliation; highest educational attainment; number of years in teaching; and latest PES rating; and (5) There was no significant relationship between the level of cloud computing utilization and the level of teaching competence among IT Faculty.

Based on the findings and conclusions stated, the following recommendations are advanced: (1) In the case of training and retraining of IT Faculty, it would be beneficial to focus on teaching competence as the essential process to be transformed; (2) It is also suggested that training regarding cloud computing will not only be

for IT Faculty but also non-IT Faculty, traditional teachers and non-teaching staff of the institution; (3) The result of the study yield very high in the level of utilization of cloud computing and the teaching competence among IT Faculty. The researcher suggests that a similar study can be conducted based on the national competency standard, and (4) It is therefore recommended that the government make funds available to provide ICT infrastructure in higher education institutions in the country. Also, special funds should be set aside to revamp the e-learning center for students, faculty, and staff.

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