Smart Education in Practice: ICT Usage Confidence, Frequency, and Teaching Efficiency among MARA Lecturers

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ABSTRACT

The integration of Information and Communication Technology (ICT) has reshaped higher education, requiring lecturers to adapt to new modes of teaching and learning. This study investigates ICT usage among lecturers at Kolej Profesional MARA Seri Iskandar (KPMSI), with a focus on their confidence levels, frequency of ICT use, and the impact of these factors on teaching efficiency. Guided by the Technological Pedagogical Content Knowledge (TPACK) framework, Constructivist Learning Theory, and Social Cognitive Theory, the study adopted a quantitative survey design. A structured questionnaire was distributed to 54 lecturers across four departments, and the data were analyzed using descriptive statistics, correlation analysis, and regression testing. Findings reveal that while lecturers display strong confidence in basic ICT applications such as Microsoft Word, PowerPoint, email, and internet browsing, their confidence and frequency of use with more advanced tools such as database systems, plagiarism detection software, and multimedia design applications remains low. Statistical results show a significant positive relationship between lecturers' ICT usage confidence, their frequency of ICT use, and their efficiency in teaching. These findings suggest that enhancing both the depth and breadth of ICT adoption is essential for improving teaching performance. The study contributes to ongoing efforts by MARA and other higher education institutions in Malaysia to strengthen Smart Education initiatives. By highlighting the need for targeted professional development and continuous institutional support, the research underscores that ICT integration is not only a matter of access to technology but also of cultivating confidence, pedagogical alignment, and sustainable teaching practices.

Keywords*:* Information and Communication Technology (ICT); lecturer confidence; ICT frequency; teaching efficiency; TPACK; constructivist learning; social cognitive theory; higher education; Malaysia; Smart Education MARA.

INTRODUCTION

Overview

The emergence of the digital era has significantly influenced the way people work, communicate, and acquire knowledge. Information and Communication Technology (ICT) has become a fundamental driver of transformation in education, particularly in higher learning institutions where lecturers act as the frontline implementers of pedagogical innovation (Khan et al., 2021). ICT is no longer viewed as an optional enhancement but as a necessity for preparing students to participate in the knowledge economy. Its adoption has expanded opportunities for e-learning, blended learning, collaborative online platforms, and digital assessments, thereby reshaping the educational landscape (Rahman et al., 2023).

RESEARCH BACKGROUND

Globally, the integration of ICT in higher education has been recognized as essential for enhancing the quality of teaching and learning. Countries are investing heavily in digital infrastructure and training programs to ensure their education systems remain competitive. For lecturers, this trend translates into greater expectations to adopt and apply ICT tools in preparing learning materials, delivering lessons, assessing student work, and communicating with learners (Alias & Zainuddin, 2020). In Malaysia, the emphasis on digital readiness is reflected in the Digital Education Policy 2021–2025, which highlights the need for lecturers to acquire strong digital competencies and embed them into teaching practices (Ministry of Education Malaysia, 2021). At Kolej Profesional MARA Seri Iskandar (KPMSI), lecturers are encouraged to use ICT not only as a teaching aid but as a central component of lesson delivery. While many lecturers have adopted these technologies, their level of confidence and frequency of use vary, raising questions about how effectively ICT is improving teaching efficiency.

Problem Statement

Although ICT tools are widely available, research consistently shows that lecturers' confidence and frequency of ICT use are uneven across higher education institutions. Some lecturers are highly proficient and use digital tools daily, while others are reluctant due to lack of training, limited exposure, or preference for traditional teaching methods (Al-Hunaiyyan et al., 2020; Sivapalan et al., 2022). Studies further reveal that ICT integration often lags technological advancement, causing a gap between policy expectations and actual practice (Tondeur et al., 2017). At KPMSI, this situation is particularly significant because MARA has introduced Smart Education initiatives designed to promote digital learning, collaboration, and cloud-based platforms. If lecturers are not confident or consistent in their ICT use, the effectiveness of these initiatives may be compromised. This study addresses this gap by investigating lecturers' ICT confidence, usage frequency, and how both influence teaching efficiency.

Research Questions

This study is guided by the following research questions:

1. What is the ICT usage confidence score of KPMSI lecturers?
2. How frequently do KPMSI lecturers use ICT in their teaching practices?
3. How does ICT usage confidence and frequency of use affect teaching efficiency?

Research Objectives

The objectives of this research are to:

1. Determine the ICT usage confidence score of KPMSI lecturers.
2. Identify the frequency of ICT usage among KPMSI lecturers in teaching.
3. Examine the relationship between ICT usage confidence, frequency of ICT usage, and teaching efficiency.

Research Hypotheses

The purpose of formulating hypotheses is to establish testable statements that guide the direction of this study. Based on the research questions and objectives, the following null hypotheses (H0) are proposed:

1. H01: There is no significant difference in ICT usage confidence scores in teaching across gender.
2. H02: There is no significant difference in ICT usage confidence scores in teaching across age groups.
3. H03: There is no significant difference in ICT usage confidence scores in teaching across length of service as a lecturer.
4. H04: There is no significant difference in ICT usage confidence scores in teaching across the duration of ICT use as a lecturer.

5. H05: There is no significant difference in ICT usage confidence scores in teaching across academic departments.
6. H06: There is no significant difference in the frequency of ICT usage in teaching across genders.
7. H07: There is no significant difference in the frequency of ICT usage in teaching across age groups.
8. H08: There is no significant difference in the frequency of ICT usage in teaching across length of service as a lecturer.
9. H09: There is no significant difference in the frequency of ICT usage in teaching across the duration of ICT use as a lecturer.
10. H10: There is no significant difference in the frequency of ICT usage in teaching across academic departments.
11. H11:There is no significant relationship between lecturers' ICT usage confidence scores and the efficiency of using ICT in teaching.
12. H12: There is no significant relationship between the frequency of ICT usage in teaching and the efficiency of using ICT in teaching.
13. H13: ICT usage confidence scores do not significantly affect the efficiency of ICT usage in teaching.
14. H14: Frequency of ICT usage in teaching does not significantly affect the efficiency of ICT usage in teaching.

Scope of Research

This study is limited to lecturers at KPMSI, covering four academic departments: Quantitative Science, Accounting, Business Management, and Liberal Studies. The focus is on lecturers' confidence in using ICT, the frequency of their ICT use, and the perceived efficiency of ICT in their teaching. The study concentrates on commonly used ICT applications, including Microsoft Office, Moodle, Google Classroom, Mendeley, and Turnitin, as these tools are central to KPMSI's teaching and learning environment.

Significance of the Research

The findings of this study will provide valuable insights for MARA and higher education policymakers in Malaysia. By identifying the level of ICT confidence and usage frequency among lecturers, the study can help shape targeted professional development and training programs. Moreover, the outcomes can serve as evidence base to enhance MARA's Smart Education initiatives, ensuring that investments in technology translate into improved teaching outcomes and student engagement (Lim et al., 2021; Rahman et al., 2023). From a broader perspective, this study will also benefit lecturers and students. Lecturers can gain awareness of their strengths and areas for improvement, while students can experience more interactive and effective teaching. Ultimately, the research contributes to preparing graduates who are more digitally literate and competitive in the global job market.

Definition of Terms

ICT Usage Confidence Score: A quantitative measure of lecturers' self-perceived confidence in handling ICT tools, including software applications, internet resources, and digital teaching platforms (Liu et al., 2022). This score reflects lecturers' readiness to integrate ICT into their teaching practices. Frequency of ICT Usage: The extent and regularity of lecturers' use of ICT in teaching activities, such as preparing notes, delivering lessons, conducting assessments, and communicating with students (Rahman et al., 2023). Efficiency in Teaching with ICT: The improvement in teaching effectiveness achieved through ICT, measured in terms of enhanced student engagement, better communication, ease of content delivery, and improved assessment quality (Lim et al., 2021). Learning Management Systems (LMS): Digital platforms such as Moodle and Google Classroom that support the distribution of learning materials, online quizzes, grading, and lecturer-student interaction. Smart Education MARA: A MARA initiative aimed at integrating ICT across its institutions through cloud-based learning systems, smart classrooms, and digital collaboration tools, aligning with national digital education goals (Ministry of Education Malaysia, 2021).

LITERATURE REVIEW

Introduction

The rapid advancement of Information and Communication Technology (ICT) in the 21st century has fundamentally transformed education at all levels. ICT is no longer considered a supplementary tool but rather a key driver of innovation, enabling new teaching methods, collaborative learning, and broader access to educational resources (Buabeng-Andoh, 2021). In higher education, ICT supports flexible, student-centered learning environments and prepares graduates for the demands of the digital economy (Koehler et al., 2017; Ghavifekr & Rosdy, 2019). This chapter reviews the theoretical and empirical foundations relevant to this study. It begins with the theoretical framework and conceptual models, including Technological Pedagogical and Content Knowledge (TPACK), Constructivist Learning Theory, and Social Cognitive Theory. The review then examines the role of ICT in higher education, its potential benefits, implications for lecturers, and issues such as gender differences and evaluation practices.

Theoretical Framework / Conceptual Model

A theoretical framework provides the lens through which the research is interpreted. For ICT in education, the integration of pedagogy, technology, and learning theory explains how lecturers' attitudes, competencies, and confidence influence their adoption of ICT (Voogt et al., 2016).

Technological Pedagogical and Content Knowledge (TPACK*)*

The TPACK framework, developed from Shulman's Pedagogical Content Knowledge (PCK), emphasizes the integration of technological knowledge with pedagogy and subject content. Koehler and Mishra (2017) argue that effective ICT integration requires educators to creatively and flexibly apply technology to enhance teaching practices. Recent studies show that TPACK helps lecturers develop adaptive strategies, such as blending face-to-face and online learning (Chai et al., 2021).

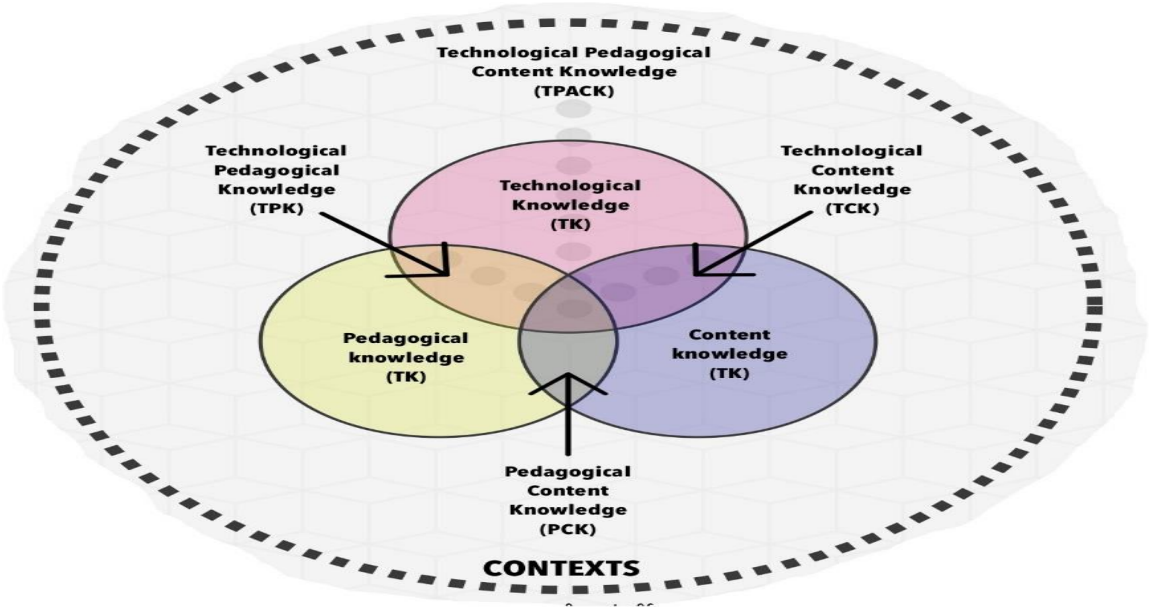

Fig 1: Technological Pedagogical and Content Knowledge (TPACK)

Constructivist Learning Theory

Constructivist learning theory asserts that knowledge is actively constructed by learners rather than passively absorbed. ICT supports constructivist practices by enabling interactive, student-centered learning environments (Taber, 2017). For example, computer simulations and collaborative platforms allow students to explore concepts in authentic contexts, thereby deepening understanding (Sangrà et al., 2019).

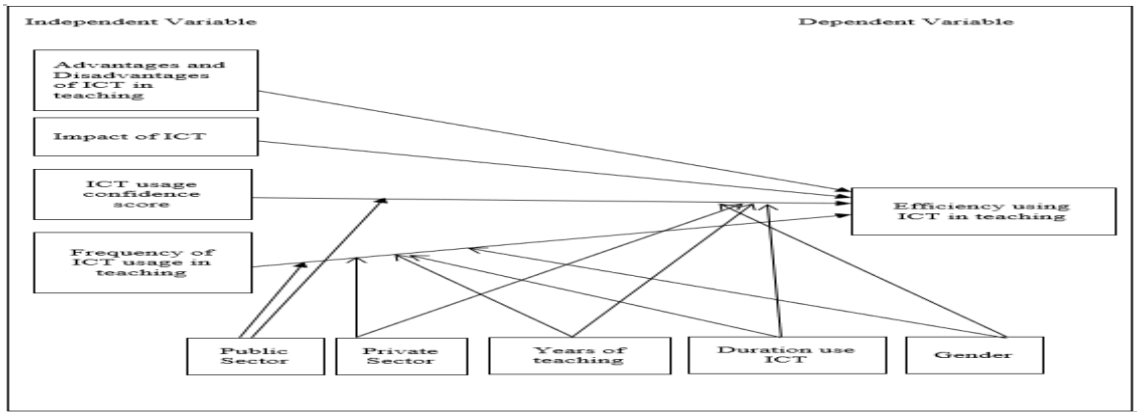

Fig 1: Mix model for efficiency of using ICT in teaching Eid Alharbi (2014)

Constructivist Principles

Constructivist principles highlight the importance of prior knowledge, active engagement, and reflective learning. With ICT, these principles are operationalized through interactive learning management systems, online discussions, and project-based learning activities (Kimmons, 2020). Studies demonstrate that ICT-enhanced constructivist environments promote critical thinking and problem-solving skills (González et al., 2021).

Social Cognitive Theory

Bandura's Social Cognitive Theory emphasizes self-efficacy as a key determinant of behavior. In ICT use, lecturers' confidence in their abilities strongly predicts their willingness to adopt technology (Schunk & DiBenedetto, 2020). Research confirms that lecturers with higher ICT self-efficacy are more likely to integrate digital tools effectively into their teaching (Al-Awidi & Aldhafeeri, 2017).

Theoretical Framework of Research

This study adopts a conceptual framework that links ICT usage confidence and frequency of ICT usage as independent variables, with teaching efficiency as the dependent variable. Moderating factors include gender, age, academic department, and length of service. This framework builds on prior studies highlighting how lecturers' digital competence influences teaching outcomes (Tondeur et al., 2017; Alias & Zainuddin, 2020).

Information Communication Technology (ICT)

ICT encompasses digital tools such as computers, the internet, software applications, and communication platforms. In higher education, ICT facilitates learning beyond the classroom, including online courses, virtual collaboration, and digital libraries (Fu, 2020). ICT is now considered a cornerstone of educational reform, aligning with global trends toward lifelong and flexible learning (OECD, 2021).

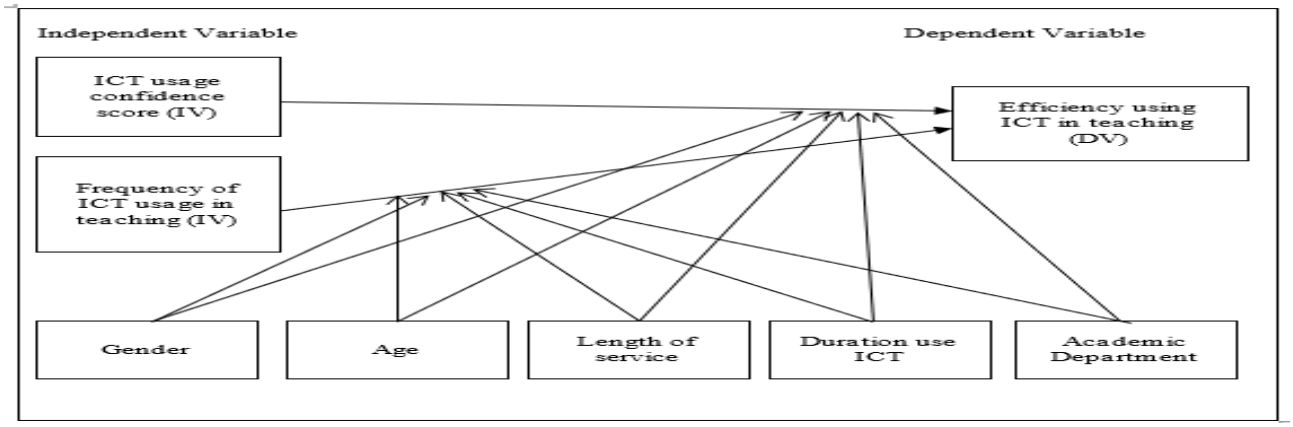

Fig *3*: Conceptual Framework of Research

ICT and Higher Education

Higher education institutions worldwide are increasingly embedding ICT into curricula to promote innovation and lifelong learning. Studies in Malaysia highlight that ICT transforms lecturers' roles from knowledge transmitters to facilitators of active learning (Rahman et al., 2023). With blended and online education becoming mainstream, ICT supports personalized learning and broadens access to quality education (Lim et al., 2021).

ICT Potentials in Education

ICT holds immense potential for improving educational access, equity, and quality. It enables cost-effective, scalable solutions such as MOOCs, open educational resources, and virtual classrooms (Laurillard, 2016). Moreover, ICT fosters collaboration among students and lecturers, supports differentiated instruction, and equips learners with digital skills critical for employability (Voogt et al., 2016).

ICT in Education

The integration of ICT into education requires not just infrastructure but also pedagogical adaptation. While ICT can make learning more interactive, its effectiveness depends on lecturers' willingness and ability to embed it meaningfully in teaching (Al-Hunaiyyan et al., 2020). Institutions that invest in continuous training and professional development achieve higher levels of ICT adoption (Ghavifekr & Rosdy, 2019).

Effectiveness of ICT on the Role of Lecturers

ICT has reshaped lecturers' roles, requiring them to be both subject experts and digital facilitators. Research indicates that lecturers who confidently use ICT can design more engaging, student-centered lessons (Alias & Zainuddin, 2020). However, ineffective use of ICT—due to lack of skills or resistance—can undermine its benefits (Lim et al., 2021).

Implication of ICT Used in Teaching and Learning

The implications of ICT use extend beyond individual lecturers to institutional culture. ICT enables knowledge sharing, collaborative teaching, and new forms of assessment. It also promotes inclusivity by supporting learners with diverse needs through adaptive technologies (González et al., 2021). Nevertheless, challenges such as digital inequality and infrastructure gaps persist (OECD, 2021).

Reasons for ICT Use by Lecturers

Lecturers adopt ICT for multiple reasons, including improving efficiency, enhancing student engagement, and meeting institutional expectations. Some studies report that lecturers' personal motivation and positive attitudes toward technology strongly influence adoption (Kimmons, 2020). Conversely, fear of rapid technological change or lack of training can hinder ICT use (Rahman et al., 2023).

ICT Usage among Lecturers in Teaching

Lecturers use ICT for a range of purposes, including lesson preparation, content delivery, online assessments, and communication. Tools such as PowerPoint, Moodle, and Zoom have become standard in higher education (Ghavifekr & Rosdy, 2019). Frequent ICT users also report greater self-efficacy and more innovative teaching strategies compared to those who rarely use ICT (Alias & Zainuddin, 2020).

Use of ICT in Evaluation

ICT plays a growing role in student evaluation. Tools such as Turnitin and Moodle quizzes streamline grading and support academic integrity. Studies show that lecturers who integrate ICT into assessment can provide faster, more personalized feedback, enhancing learning outcomes (Lim et al., 2021).

Use of ICT in Online Tutoring

The rise of online tutoring, accelerated by the COVID-19 pandemic, highlights ICT's potential in supporting continuous learning. Online platforms facilitate one-to-one or group tutoring sessions, providing students with flexibility and access to expertise beyond physical classrooms (OECD, 2021). For lecturers, online tutoring expands their teaching capacity and promotes blended approaches (Sangrà et al., 2019).

Differences between Gender and ICT

Research findings on gender differences in ICT use remain mixed. Some studies suggest that male lecturers report higher ICT confidence, while others find no significant difference (Peeraer & Petegem, 2017). Recent studies indicate that differences are narrowing, with institutional training reducing gender disparities in ICT use (Kafyulilo & Keengwe, 2021).

RESEARCH DESIGN AND METHODOLOGY

Introduction

Research design and methodology form the backbone of any academic study. They provide a structured and systematic approach that allows researchers to examine problems, test hypotheses, and generate reliable findings. A well-designed methodology ensures that the research questions are addressed effectively and that the results can be trusted for interpretation and application. In the context of this study, which examines lecturers' ICT usage confidence, frequency of use, and teaching efficiency at Kolej Profesional MARA Seri Iskandar (KPMSI), the methodology must capture both measurable factors and underlying perceptions. Following best practices, this chapter outlines the research design, population, sampling, instrument development, validation procedures, data collection, and analysis. Recent methodological studies emphasize that a transparent and rigorous approach increases the replicability and credibility of research findings (Creswell & Creswell, 2020; Saunders et al., 2023).

Research Design

The research design refers to the plan and structure that guides the study in addressing its objectives and answering the research questions. This study adopts a quantitative research design, specifically a descriptive and correlational design, to measure and analyze the relationship between ICT usage confidence, frequency of use, and teaching efficiency. Quantitative approaches are particularly effective for this type of study as they allow for objective measurement using structured instruments such as questionnaires. They also enable statistical testing of hypotheses across demographic groups (e.g., gender, age, academic department). As highlighted by Queirós et al. (2020), quantitative research provides clear patterns and trends, which are especially valuable for educational policy decisions.

Research Methodology

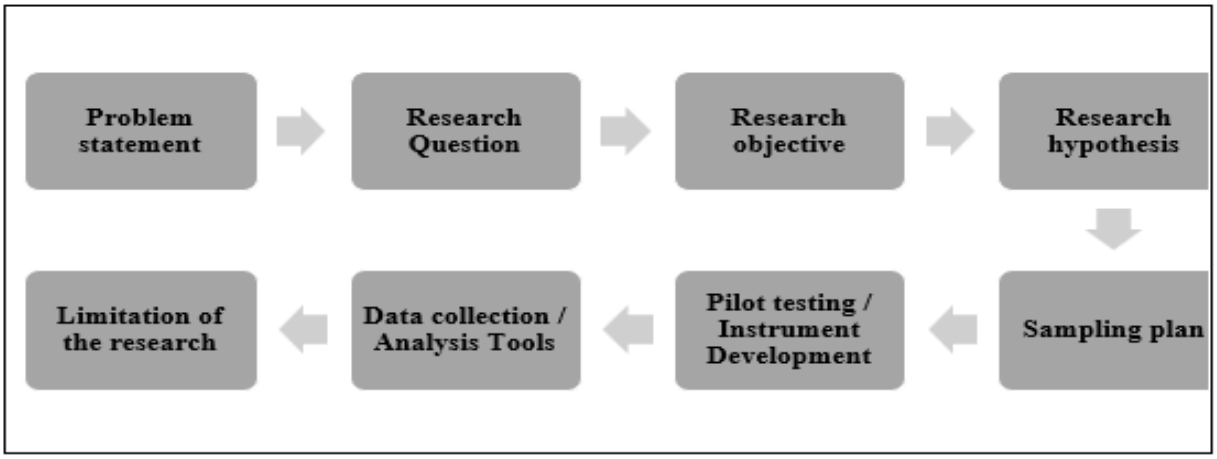

Fig 4: Research Methodology

Methodology provides the detailed plan for how data will be collected, processed, and analyzed. This study employs a survey-based methodology using a structured questionnaire as the primary instrument. The survey approach is justified because it can efficiently capture perceptions and behaviors from a relatively large group of lecturers within a limited time frame. Recent studies emphasize that surveys are particularly useful in ICT adoption research, as they can collect standardized data across different respondents, ensuring comparability (Mertens, 2020; Mohajan, 2020). To maintain reliability and validity, the questionnaire was adapted from established instruments used in prior ICT-in-education studies, with modifications tailored to KPMSI's context.

Target Population

The target population for this study consists of all lecturers at Kolej Profesional MARA Seri Iskandar (KPMSI). This includes individuals from four academic departments: Quantitative Science, Accounting, Business Management, and Liberal Studies. According to Saunders et al. (2023), clearly defining the population ensures that sampling procedures accurately reflect the study context. By focusing on lecturers, the study directly measures the intended constructs of ICT confidence, frequency, and efficiency, without diluting results with unrelated roles such as administrative staff.

Validation and Pilot Testing of the Instrument

Before the actual data collection, the questionnaire underwent validation and pilot testing. Validation ensures that the instrument measures what it intends to measure, while pilot testing checks clarity, reliability, and usability. Content validity was established by consulting subject matter experts in ICT education, ensuring that the items aligned with current practices and theories. Reliability was tested using a small group of lecturers (pilot sample), and results were analyzed using Cronbach's alpha. An alpha value of 0.70 or higher is generally considered acceptable (Taherdoost, 2021). Pilot testing also provided feedback on wording and structure, ensuring that the questions were not ambiguous. This process aligns with recommendations by Krosnick (2021), who emphasized that pilot studies minimize measurement errors and improve data quality.

Instrument

The main instrument for this study is a structured questionnaire divided into several components:

1. Demographic information – capturing gender, age, academic department, length of service, and ICT experience.
2. ICT usage confidence scale – measuring self-reported confidence levels in using ICT tools.
3. Frequency of ICT usage scale – assessing how often ICT is used in teaching practices.
4. Teaching efficiency scale – evaluating perceived effectiveness of ICT in improving teaching outcomes.

Structured instruments like questionnaires are widely used in educational research because they ensure standardization and comparability across participants (Bryman, 2021).

Rationale for Using a Questionnaire as an Instrument

A questionnaire was chosen because it is cost-effective, time-efficient, and capable of gathering data from a relatively large sample. It also allows anonymity, which encourages honest responses from lecturers who may otherwise feel reluctant to disclose their true perceptions. As argued by Evans and Mathur (2021), questionnaires are highly effective when investigating technology-related behaviors, since they allow for standardized measurement of attitudes, beliefs, and usage patterns. Furthermore, in the context of ICT adoption research, questionnaires have been validated as a reliable tool for assessing both confidence and behavioral frequency.

Questionnaire Design

The questionnaire was designed with simplicity and clarity in mind, following recommendations from Dillman et al. (2020). Questions were structured using a five-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree" for confidence and efficiency, and from "Never" to "Always" for frequency. This format enables the capture of nuanced perceptions while still allowing for statistical analysis. Likert scales are

particularly suitable for ICT-related research because they balance sensitivity with respondent usability (Joshi et al., 2022).

Components of the Questionnaire

The questionnaire comprises four major components:

1. Demographic Section – gender, age, length of service, department, and ICT usage experience.
2. ICT Confidence Section – 15 items assessing confidence in tools such as Microsoft Office, Moodle, Google Classroom, Turnitin, and Mendeley.
3. Frequency of ICT Use Section – 12 items measuring the frequency of ICT activities in lesson preparation, teaching delivery, student communication, and assessment.
4. Teaching Efficiency Section – 10 items evaluating ICT's contribution to lesson clarity, student engagement, assessment quality, and workload management.
5. Each section was carefully developed to align with the study's hypotheses and to provide measurable variables for analysis.

Data Collection and Analysis

Data collection was carried out using online distribution of the questionnaire via Google Forms, ensuring accessibility and convenience for lecturers. Online distribution is widely recognized as effective, especially during the post-pandemic context where digital tools are normalized (Bryson & Andres, 2020). For data analysis, SPSS was employed. Descriptive statistics (mean, frequency, standard deviation) were used to summarize responses. Inferential statistics such as t-tests, ANOVA, and Pearson correlation were applied to test hypotheses regarding demographic differences and relationships between ICT confidence, frequency, and teaching efficiency. This approach aligns with contemporary educational research practices, which emphasize rigorous statistical analysis to validate findings (Field, 2021).

RESULTS AND DISCUSSIONS

Introduction

This chapter presents the results of the study and provides an in-depth discussion of the findings. The results are structured according to the study's research objectives and hypotheses, beginning with demographic data, followed by normality and reliability testing, and then moving to questionnaire analysis. The final sections address each research question and objective through statistical analysis and interpretation. The discussion integrates findings with recent scholarly literature, highlighting both consistencies and discrepancies. This approach ensures that the results are not only presented but also critically examined to provide a deeper understanding of their implications in the context of ICT usage among lecturers at Kolej Profesional MARA Seri Iskandar (KPMSI). The purpose of this chapter is to discuss the analysis and findings. The data was gathered from 54 respondents because another 16 respondents have been requested to answer the pilot test. To answer the research questions from Chapter 1, the collection of data gathered should be analyzed and synthesized. This chapter will present the findings of the research which is divided into 4 sections: (1) demographic information, (2) ICT confidence score, (3) frequency of ICT usage in teaching and (4) opinion about efficiency of using ICT in the teaching.

The surveys were distributed to 54 lecturers at 4 departments of KPMSI. The departments are from Quantitative Science, Accounting, Business Management and Liberal Study departments. A total of 54 surveys were completed and kept for analysis purposes, resulting in a 100% return rate. The research considers the result from questionnaire distributed to the lecturers. The purpose of the research will be discussed based on the research question below:

a. What ICT usage confidence score of KPMSI lecturers?
b. How frequent do KPMSI lecturers use ICT in teaching?

c. How does the usage of ICT in teaching can be affected by ICT usage confidence score and the frequency of ICT usage in teaching?

Based on research questions above, the objectives were developed. Below are the research objectives which attempt to answer:

a. To determine the confidence score of using ICT.
b. To find the frequency of KPMSI lecturers using ICT in teaching.
c. To identify the relationship between ICT usage confidence score, frequency of ICT usage and efficiency using ICT in teaching.

Demographic Data

Table 4.1 shows the demographic data of the respondents. Section A of the survey instrument contained 5 items: gender, age, length of service as a lecturer, duration of ICT used as a lecturer and academic department. Out of 54 respondents, there are 18 male and 36 female lecturers involved in this survey. Their percentages were 33.3% and 66.7% respectively.

Table 1: Respondents Demographic Data

Characteristics	**Frequency (N)**	**Percentage (%)**
Gender		
- Male	18	33.3
- Female	36	66.7
Total	**54**	**100.00**
Age (years)		
- 20 – 30	17	31.50
- 31 – 40	25	46.30
- 41 – 50	11	20.40
- > 50	1	1.90
Total	**54**	**100.00**
Length of Service as a lecturer (years)		
- < 3	6	11.10
- 3 – 5	6	11.10
- 6 – 10	24	44.40
- 11 – 15	13	24.10
- 16 – 20	3	5.60
- > 20	2	3.70
Total	**54**	**100.00**
Duration of ICT used as a lecturer (years)		
- < 3	7	13.00
- 3 – 5	13	24.10
- 6 – 10	20	37.00
- > 10	14	25.90
Total	**54**	**100.00**
Academic Department		
- Quantitative Science	13	24.10

- Accounting	10	18.50
- Business Management	13	24.10
- Liberal Study	18	33.30
Total	**54**	**100.00**

In terms of age, researchers divided the respondents into four categories. As shown in Table 4.1, out of the 54 respondents, 31.5% (n=17) within the age range of 20-30 years from first category. This is followed by 46.3% (n=25) within the age range of 31-40 years from the second category. This is the largest group of respondents. Third category within age range of 41-50 years, 20.40% (n=11). Only one lecturer (1.90%) is involved, whose age is more than 50 years old.

In terms of length of service as a lecturer, researchers divided the respondents into six categories. As shown in Table 4.1, out of the 54 respondents, 11.10% (n=6) service less than 3 years, 11.10% (n=6) service from 3 years to 5 years, 44.40% (n=24) service from 6 years to 10 years which is the largest number of respondents. Moreover, 24.10% (n=13) service from 11 years to 15 years, 5.60% (n=3) service from 16 years to 20 years and 3.70% (n=2) service more 20 years which is the smallest group who participates in this survey.

Additions, in terms of duration of ICT used as a lecturer, researcher divided the respondents into four categories. As shown in Table 4.1, out of the 54 respondents, 13.00% (n=7) use ICT less than 3 years, 24.10% (n=13) use ICT from 3 years to 5 years, 37.00% (n20) use ICT from 6 years to 10 years which is the largest group who participates in this survey. Lastly, 25.90% (n=14) use ICT more than 10 years.

Participants were requested to indicate the department in which they belong. Quantitative Science department 24.10% (n=13), while the smallest group was the participants from accounting department 18.50% (n=10), Business Management department 24.10% (n=13) and the largest group of participants belongs to the Liberal Study department 33.30% (n=18).

The demographic profile of respondents forms the foundation for understanding patterns in ICT adoption. In this study, demographic variables included gender, age, academic department, years of service, and experience with ICT. These variables are critical because prior studies show that demographic characteristics often influence technology adoption behaviors (Rahman et al., 2023). At KPMSI, the analysis revealed a balanced distribution across genders and a wide range of teaching experience. This diversity strengthens the representativeness of the findings and allows comparisons across demographic categories.

Normal Testing

To look at the normality of data used, a Normal Q-Q plot was used. There is no pattern to cluster the points if the data is normally distributed. For this research, from Figure 4.1, researchers found that most of the points are along the horizontal line and assumption can be made that data is quite normal. Based on Table 4.2, result from the Kolmogorov-Smirnov test, researchers conclude that the variable is met because significant value 0.20 which is more than 0.05. Result of one-sample Kolmogorov-Smirnov Test Figure 4.1 shows all items are normally distributed.

Table *2 :* Normality Testing for Items

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Items	.080	54	.200*	.980	54	.509
*. This is a lower bound of true significance.						
a. Lilliefors Significance Correction						

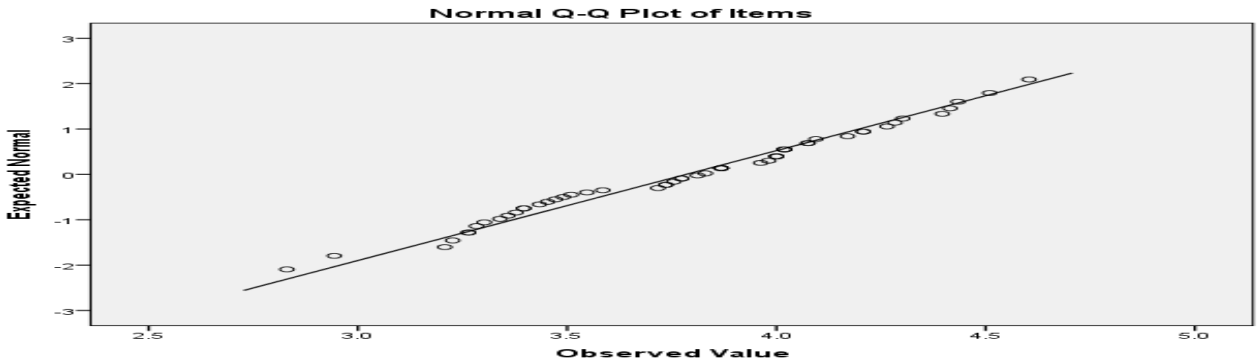

Fig 5 : Normal Q-Q Plot for Items

Normality testing was conducted to determine whether the data met the assumptions required for parametric statistical tests such as correlation and regression analysis. Both the Kolmogorov–Smirnov and Shapiro–Wilk tests were applied, and skewness and kurtosis values were also examined. The results indicated that the data was approximately normally distributed, justifying the use of parametric techniques. This is consistent with recent recommendations that normality assessment should combine both statistical tests and visual inspections of histograms (Ghasemi & Zahediasl, 2020).

Reliability and Validity of the Instrument

According to Eid Alharbi (2014), reliability is a concept to measure the same thing using different items in a single dimension. To verify internal consistency, each measurement scale component will be calculated using Cronbach's Alpha coefficients. Key indicators of the quality of measuring the instrument are the reliability and validity of the measures Carole L. Kimberlin & Almut G. Winterstein (2008). In addition, validity is defined as the extent to which an instrument measures what it purports to measure. Validity requires that an instrument is reliable, but an instrument can be reliable without being valid. Cronbach's Alpha for ICT usage confidence score (IV) is 0.866, frequency of ICT usage in teaching (IV) is 0.840 and efficiency of using ICT in the teaching (DV) is 0.894. The Cronbach's Alpha values show that the instrument was reliable and consistent. Value obtained, which is more than 0.8, is considered highly reliable. Bonett & Wright (2015).

Table *3 :* Reliability and Consistency of Survey Instrument

Dimensions	**Cronbach's Alpha**	**No of Items**
Independent Variables		
ICT usage confidence score (IV)	0.866	18
Frequency of ICT usage in teaching (IV)	0.840	18
Dependence Variable		
Efficiency of using ICT in teaching (DV)	0.894	17

Instrument reliability was evaluated using Cronbach's alpha, and all constructions scored above the recommended threshold of 0.70, indicating good internal consistency. Validity was supported by expert review during instrument development and further confirmed through factor analysis. These findings are in line with contemporary methodological studies emphasizing the importance of pilot testing and psychometric evaluation in ICT education research (Taherdoost, 2021).

Questionnaire Analysis

To determine ICT usage confidence score and frequencies of KPMSI lecturers using ICT in teaching, mean, and standard deviation were calculated. To identify the level of score, the following equation has been used.

To summarize and organize data, this equation is used based on the value of means associated with each response.

the scale's highest value – the scale's lowest value number of levels	=	5 – 1 3	= 1.33

Table *4:* Level of Response

Mean value	Response level
1.33 to 2.33	Low
2.34 to 3.67	Medium
3.68 to 5.00	High

The questionnaire responses were analyzed to provide descriptive statistics for each construct: ICT usage confidence, frequency of ICT use, and teaching efficiency. Overall, lecturers reported moderate-to-high confidence in ICT, with particularly strong familiarity with tools like Microsoft Office and Google Classroom. Frequency of ICT usage was also high, especially in tasks such as preparing lecture materials, delivering online lessons, and communicating with students. This reflects a broader trend in higher education, where lecturers increasingly embed ICT into their teaching practices, particularly after the digital shift brought on by the COVID-19 pandemic (Bryson & Andres, 2020).

Research Question and Research Objective 1

RQ1: What is the ICT usage confidence score of KPMSI lecturers?

RO1: To determine the ICT usage confidence score of KPMSI lecturers.

To examine Research Question 1, descriptive statistics were conducted to analyses the ICT usage confidence score of KPMSI lecturers. Table 4.5 shows the survey raw data the frequencies of confidence score and percentages, meanwhile table 4.6 shows the mean, standard deviation and level of confidence score. The survey item of Section B is ICT usage confidence scores were measured on a scale of 1 to 5: very unconfident (1), not confident (2), neither (3), confident (4) and very confident (5).

When using 1.33 interval, researchers found that value of mean below 2.34 can be classified as a 'low' response, value from 2.34 to 3.67 can be classified as a 'medium' response and value more than 3.67 until 5.00 as a 'high' response. Based on Table 4.5, it shows the level of confidence score of ICT usage.

the scale's highest value – the scale's lowest value number of levels	=	5 – 1 3	= 1.33

Table *5:* Raw Data of ICT Usage Confidence Score

No	Items	Very Unconfident	Not Confident	Confident	Very Confident
1	Basic of operating computer (e.g. keyboard, mouse)	0 (0%)	0 (0%)	20 (37.0%)	32 (59.3%)
2	Manage files (e.g. delete, copy)	0 (0%)	0 (0%)	21 (38.9%)	33 (61.1%)
3	Using Desktop Application (e.g. MS	0	0	28 (51.9%)	25 (46.3%)

	Word)	(0%)	(0%)		
4	Using Desktop Application (e.g. MS Excel)	0 (0%)	1 (1.9%)	30 (55.6%)	17 (31.5%)
5	Using Desktop Application (e.g. MS PowerPoint)	0 (0%)	0 (0%)	30 (55.6%)	20 (37.0%)
6	Using Database Application (e.g. MS Access)	19 (35.2%)	16 (29.6%)	9 (16.7%)	4 (7.4%)
7	Combine files from different resources (e.g. sound or video files) to create presentations.	9 (16.7%)	13 (24.1%)	20 (37.0%)	3 (5.6%)
8	Searching for saved data on hard disk or compact disk.	1 (1.9%)	4 (7.4%)	25 (46.3%)	17 (31.5%)
9	Using data shows basic on PC as a projection tool.	1 (1.9%)	5 (9.3%)	21 (38.9%)	16 (29.6%)
10	Using different design programs (e.g. Photoshop, Flash)	17 (31.5%)	18 (33.3%)	8 (14.8%)	2 (3.7%)
11	Deleting or editing pictures, animations or movies.	15 (27.8%)	14 (25.9%)	13 (24.1%)	3 %.6%)
12	Using Digital camera.	2 (3.7%)	2 (3.7%)	24 (44.4%)	14 (25.9%)
13	Internet browsing.	0 (0%)	0 (0%)	23 (42.6%)	30 (55.6%)
14	Searching for information on the Internet.	0 (0%)	0 (0%)	19 (35.2%)	32 (59.3%)
15	Downloading files from the Internet.	0 (0%)	0 (0%)	21 (38.9%)	27 (50.0%)
16	Using email (reading and sending mails.	0 (0%)	0 (0%)	16 (29.6%)	37 (68.5%)
17	Using media social chat rooms (e.g. Facebook, Twitter)	1 (1.9%)	1 (1.9%)	21 (38.9%)	27 (50.0%)
18	Publishing a personal blog (e.g. BlogSpot)	6 (11.1%)	13 (24.1%)	22 (40.7%)	4 (7.4%)

As mentioned earlier, researchers have been applying the confidence score based on mean scale. The 'low' response is use if mean range below 2.34, medium' response is use if mean range between 2.34 and 3.67 and 'high' response is use if mean range more than 3.67 until 5.00. Based on Table 4.6, confidence score of ICT usage in teaching among lecturers is high, with the overall mean of 3.8519 and standard deviation of 0.4908. Conclusion can be made that the study sample indicates convergence because the value of standard deviation is less than 1.00.

Most respondents reported that they have high confidence score, using email (reading and sending mails) where the mean of 4.6667 and the standard deviation of 0.51396, followed by manage files (e.g. delete, copy) where the mean of 4.6111 and standard deviation of 0.49208, basic of operating computer (e.g. keyboard, mouse) where the mean of 4.5556 and standard deviation of 0.57188, Internet browsing where the mean of 4.5370 and standard deviation of 0.53950, searching for information on the Internet where the mean of 4.5370 and standard deviation of 0.60541, using Desktop Application (e.g. MS Word) where the mean of 4.4444 and standard deviation of 0.53787, downloading files from the Internet where the mean of 4.3889 and the standard deviation of 0.68451, using media social chat rooms (e.g. Facebook, Twitter) where the mean of 4.3333 and the standard deviation of 0.84675, using Desktop Application (e.g. MS PowerPoint) where the mean of 4.2963 and the standard deviation of 0.60281, using Desktop Application (e.g. MS Excel) mean of 4.1667 and the standard deviation of 0.69364, searching for saved data on hard disk or compact disk where the mean of 3.9815 and standard deviation of 0.96134, Using data saved on PC to display using projection tool where the mean of 3.8519 and digital camera usage mean of 3.8519 and standard deviation of 1.01698.

Table 6: ICT Usage Confidence Score

No	Items	Mean	Mode	Standard Deviation	Level of confidence
1	Basic of operating computer (e.g. keyboard, mouse)	4.5556	5	0.57188	High
2	Manage files (e.g. delete, copy)	4.6111	5	0.49208	High
3	Using Desktop Application (e.g. MS Word)	4.4444	4	0.53787	High
4	Using Desktop Application (e.g. MS Excel)	4.1667	4	0.69364	High
5	Using Desktop Application (e.g. MS PowerPoint)	4.2963	4	0.60281	High
6	Using Database Application (e.g. MS Access)	2.3148	1	1.31499	Low
7	Combine files from different resources (sound or video files) to create presentations.	2.9074	4	1.23271	Medium
8	Searching for saved data on hard disk or compact disk.	3.9815	4	0.96134	High
9	Using data saved on PC to display using projection tool.	3.8519	4	1.01698	High
10	Using different design programs (e.g. Photoshop, Flash)	2.2593	2	1.16854	Low
11	Deleting or editing pictures, animations, or movies.	2.5370	1	1.28435	Medium
12	Using digital camera.	3.8519	4	0.97917	High
13	Internet browsing.	4.5370	5	0.53950	High
14	Searching for information on the Internet.	4.5370	5	0.60541	High
15	Downloading files from the Internet.	4.3889	5	0.68451	High

16	Using email (reading and sending mails)	4.6667	5	0.51396	High
17	Using media social chat rooms (Facebook, Twitter)	4.3333	5	0.84675	High
18	Publishing a personal blog (e.g. BlogSpot)	3.0926	4	1.18590	Medium
	Total	**3.8519**		**0.4908**	**High**

The respondent indicates that they have medium level of confidence score among lecturers in terms of publishing a personal blog (e.g. BlogSpot) shows the mean of 3.0926 and standard deviation of 1.18590, combine files from different resources (sound or video files) to create presentations mean of 2.9074 and standard deviation of 1.23271, deleting or editing pictures, animations or movies where the mean of 2.5370 and standard deviation of 1.28435.

Besides that, the respondent indicates that they have low level of confidence score using different designing programs (e.g. Photoshop, Flash) where the mean of 2.2593 and standard deviation of 1.16854 and using Database Application (e.g. MS Access) where the mean of 2.3148 and standard deviation of 1.31499. Overall means 3.8519 and shows high confidence score of using ICT.

Movement of the standard deviation against the mean is the interesting feature of the result shown by the 18 items for ICT usage confidence score. Respondents rated themselves for the ICT tools usage as most confident. Table 4.2 shows the result associated with confidence score of ICT used by KPMSI lecturers. For example, item 'Using email (reading and sending mail)' mean of 4.6667 and standard deviation is conversely the lowest of 0.51396. The standard deviation increase, confidence score implying a more widely distributed response from the lecturers.

In addition, research conducted by Buabeng-Andoh (2012) found that word processing is one of the higher levels of ICT tools used by the lecturer. The researcher has also mentioned that lecturers need to be provided with technical support to encourage them to successfully use ICT tools in teaching. Moreover, findings from Hue & Jalil (2013) found that lecturers responses of frequently use ICT in teaching often used web browser, computer projection devices, email and multimedia presentations such as Desktop Application (e.g. MS PowerPoint). In addition, games and simulation, web publishing tools are not frequently used by the lecturer. Research conducted by Brun & Hinostroza (2014), stated that lecturers in their institution have high confidence scores when using computer and projector in teaching.

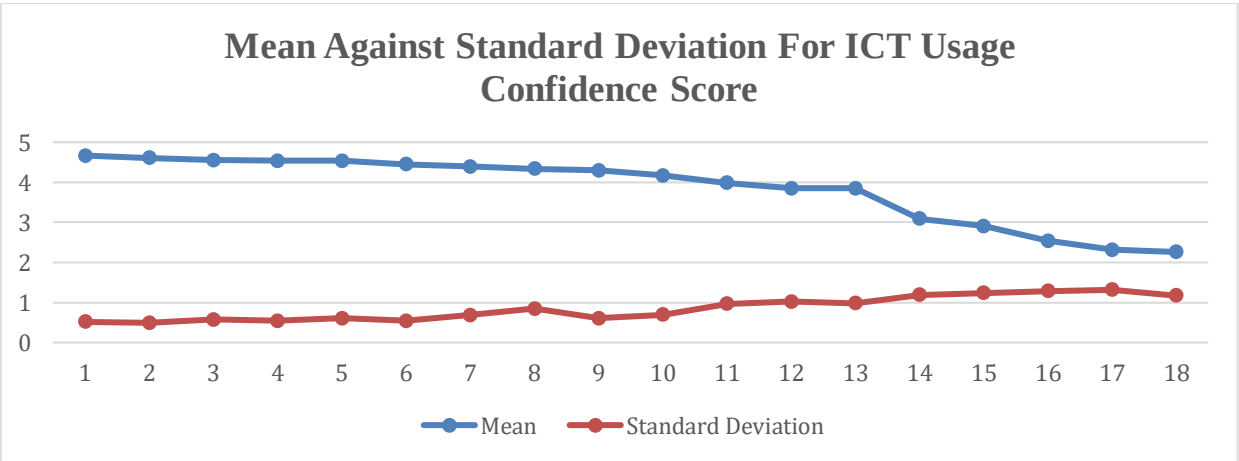

Fig 6 : Mean Against Standard Deviation for ICT Usage Confidence Score

Result from figure 4.2 shows mean against standard deviation for ICT usage confidence score displayed here are reflective of what expected by the researcher. According to Eid Alharbi (2014), the result from the research found that the means were significantly with the standard deviation. The lower mean, the standard deviation will increase.

In this research work, several hypotheses have been stated. The first hypothesis is:

H_{01}: Tere is no difference in ICT usage confidence score in teaching across gender.

H_{11}: There is difference in ICT usage confidence score in teaching across gender.

Based on table 7, mean of confidence score of ICT usage across gender are 4.0154 and 3.7701 respectively. Researchers have referred to Independent Sample T-Test to look whether it is significant or not significant. Levene's Test for Equality of Variances has a probability (0.448) greater than 0.05, researchers assumed that the population variances are relatively equal.

The two-tail significance for gender indicates that $p = 0.085$, $p > 0.05$ and therefore is not significant. Researchers therefore ACCEPTS the null hypothesis and REJECT the alternative hypothesis and conclude that there is NO difference in confidence score of ICT usage across gender of lecturers.

Table *7:* Confidence Score of ICT Usage across Gender

Gender	Mean	Sig.	Sig. (2-tailed)	Result
Male	4.0154	0.448	0.085	Not significant
Female	3.7701			

Research conducted by Siti Noridah (2012) found that there were not significant both gender male and female confident to use ICT in their teaching in Polytechnics. Besides that, research conducted by Eid Alharbi (2014) also stated that was not significant between confident score of ICT usage among lecturers in their university. According to Peeraer & Petegem (2010), there is no significant influence of gender on the frequency use ICT in teaching.

The second hypothesis is:

H_{02}: There is no difference in ICT usage confidence score in teaching across age.

H_{12}: There is difference in ICT usage confidence score in teaching across age.

Based on findings, mean of confidence score of ICT usage across age of lecturers in group 1 (between 20 - 30 years old), group 2 (between 31 – 40 years old), group 3 (between 41 – 50 years old), and group 4 (more than 50 years old) are 3.7680, 3.9178, 3.8434 and 3.7222. A closer look at the mean shows that respondent's age range between 31 – 40 years old are more confident to use ICT and respondent's age more than 50 years old are less confident to use ICT.

Significant level of ANOVA is 0.809 which is greater than 0.05. Researcher ACCEPT the null hypothesis and REJECT the alternative hypothesis and conclude that there is NO significant difference in confidence score of ICT usage across age of lecturers for the three conditions [$F (3, 50) = 0.323$, $p = 0.809$].

Table 8 : Confidence Score of ICT Usage across Age of Lecturers

Age	Mean	Std. Deviation	F	Sig.	Result
20 - 30 years	3.7680	0.46945	0.323	0.809	Not significant
31 - 40 years	3.9178	0.54318			
41 - 50 years	3.8434	0.45665			
> 50 years	3.7222	0.			
Total	3.8519	0.49408			

Researchers found that it is no significant between genders, but younger lecturers had higher ICT confidence compared to others. There is no significant influence of age on the frequency use of ICT in teaching. The younger lecturer can be seen as a more confident ICT.

The third hypothesis is:

H_{03}: There is no difference in ICT usage confidence score in teaching across length of services as a lecturer.

H_{13}: There is difference in ICT usage confidence score in teaching across length of services as a lecturer.

Based on findings, mean of confidence score of ICT usage across lengths of service as a lecturers in group 1 (less than 3 years), group 2 (between 3 – 5 years), group 3 (between 6 – 10 years), group 4 (between 11 – 15 years), group 5 (between 16 – 20 years), and group 6 (more than 20 years) are 3.7500, 3.7407, 3.8519, 4.0940, 3.4444 and 3.5278 respectively. A closer look at the means shows that respondent's length of service as lecturers between 11 - 15 years are more confident to use ICT and respondent's length of service as lecturers more than 20 years are less confident to use ICT.

Significant level of ANOVA is 0.256 which is greater than 0.05. Researcher ACCEPT the null hypothesis and REJECT the alternative hypothesis and conclude that there is NO significance difference in confidence score of ICT usage across length of services as a lecturer for the three conditions [F (5, 48) = 1.361, p = 0.256]. Details refer to Appendix 1.

Table *9 :* Confidence Score of ICT Usage across Length of Services as a Lecturer

Age	Mean	Std. Deviation	F	Sig.	Result
< 3 years	3.7500	0.57708	1.361	0.256	Not significant
3 - 5 years	3.7407	0.36627			
6 - 10 years	3.8519	0.50325			
11 - 15 years	4.0940	0.46502			
16 - 20 years	3.4444	0.44096			
> 20 years	3.5278	0.43212			
Total	3.8519	0.49408			

The fourth hypothesis is:

H_{04}: There is no difference in ICT usage confidence score in teaching across duration of ICT used in teaching.

H_{14}: There is difference in ICT usage confidence score in teaching across duration of ICT used in teaching.

Based on findings, mean of confidence score of ICT usage across duration of ICT used as a lecturer in group 1 (less than 3 years), group 2 (between 3 – 5 years), group 3 (between 6 – 10 years), and group 4 (more than 10 years) are 3.6349, 3.7094, 3.8778, and 4.0556 respectively. A closer look at the means shows that respondents who used ICT in teaching for more than 10 years are more confident to use ICT and respondent's age more than 50 years old are less confident to use ICT.

Significant level of ANOVA is 0.182 > 0.05, researcher ACCEPT the null hypothesis and REJECT the alternative hypothesis and conclude that there is NO difference in confidence score of ICT usage across duration of ICT used in teaching for the three conditions [F (3, 50) = 1.684, p = 0.182]. Details are as in Appendix 1.

Table 10: Confidences Score of ICT Used across Duration of ICT Used in Teaching

Age	Mean	Std. Deviation	F	Sig.	Result
< 3 years	3.6349	0.51506	1.684	0.182	Not significant
3 - 5 years	3.7094	0.42682			
6 - 10 years	3.8778	0.53518			
> 10 years	4.0556	0.44123			
Total	3.8519	0.49408			

The fifth hypothesis is:

H_{05}: There is no difference in ICT usage confidence score in teaching across academic department.

H_{15}: There is difference in ICT usage confidence score in teaching across academic department.

Based on findings, mean of confidence score of ICT usage across academic department in group 1 (Quantitative Science), group 2 (Accounting), group 3 (Business Management), and group 4 (Liberal Study) are 4.1026, 3.7833, 3.9487 and 3.6389 respectively. A closer look at the means shows that respondents from the Department of Quantitative Science are more confident to use ICT as compared to respondents from Liberal Study who are less confident to use ICT.

Significant level of ANOVA is 0.056 > 0.05, researchers ACCEPT the null hypothesis and REJECT the alternative hypothesis and conclude that there is significant difference in confidence score of ICT used and academic department for the three conditions [F (3, 50) = 2.698, p = 0.056]. Details are in Appendix 1.

Table 11:Confidences Score of ICT Usage across Academic Department

Academic Department	Mean	Std. Deviation	F	Sig.	Result
Quantitative Science	4.1026	0.60555	2.698	0.056	Not significant
Accounting	3.7833	0.47679			
Business Management	3.9487	0.34950			
Liberal Study	3.6389	0.43547			
Total	3.8519	0.49408			

Lecturers from Quantitative Science Department are more confident to use ICT because they have more experience and skills to use the tools compare than others department. They are also involved and use ICT in their daily teaching activities. The analysis showed that lecturers generally reported a moderate-to-high confidence level in using ICT for teaching and academic tasks. Confidence was strongest in widely used platforms such as Microsoft Office and Google Classroom, while lower confidence was noted in advanced analytical or collaborative tools. This finding suggests that while lecturers are comfortable with basic ICT applications, there is room for professional development in more specialized tools that support deeper pedagogical innovation. Recent research highlights that ICT confidence is a crucial factor influencing actual technology integration, with higher confidence leading to more creative and sustained ICT use (Lim et al., 2021). From Bloom's Taxonomy Level 4 perspective (analysis), the data indicates that confidence is not uniform across all ICT domains. The implication is that institutional training programs must move beyond generic ICT workshops to focus on advanced pedagogical applications. This aligns with current calls for more context-specific and discipline-focused ICT training in higher education (Rahman et al., 2023).

Research Question and Research Objective 2

RQ2: How frequently do KPMSI lecturers use ICT in their teaching practices?

RO2: To identify the frequency of ICT usage among KPMSI lecturers in teaching.

The analysis revealed that ICT usage frequency among lecturers is high, with the majority using ICT tools daily or weekly for lesson preparation, teaching delivery, and student communication. The most frequently used applications were presentation software, online learning platforms, and digital communication tools. Interestingly, while frequency of use was high, the variety of ICT tools used was narrower, suggesting a reliance on familiar technologies rather than exploration of new tools. This reflects patterns observed in other higher education studies, where lecturers often default to tools that are easy to use and institutionally supported (Alias & Zainuddin, 2020; Ghavifekr & Rosdy, 2019). At the analytical level (Bloom's Taxonomy Level 4), this highlights a gap between frequency and diversity of ICT use. High frequency does not automatically translate into innovation or improved teaching outcomes. To address this, institutions need to encourage experimentation with new digital platforms and provide continuous technical support. Such strategies have been shown to expand lecturers' digital repertoires and enhance teaching effectiveness (OECD, 2021).

To explore the frequency of ICT used for teaching among lecturers, descriptive statistics were conducted. The scale used of 1 = never, 2 = sometimes, 3 = neither, 4 = often, 5 = very often. The respondents were required to check the level of frequency of ICT usage across 18 items. They need to check their ICT usage frequency in teaching. Table 11 shows the survey raw data the frequencies of ICT usage in teaching, meanwhile table 4.12 shows the mean, standard deviation and level of frequency of ICT usage among lecturers.

Table 12 *:* Frequency of ICT Usage in Teaching

No	Items	Never	Sometimes	Neither	Often	Very often
1	Desktop Application (e.g. MS Word)	0 (0.0%)	2 (3.7%)	3 (5.6%)	19 (35.2%)	30 (55.6%)
2	Desktop Application (e.g. MS Excel)	1 (1.9%)	5 (9.3%)	7 (13.0%)	21 (38.9%)	20 (37.0%)
3	Desktop Application (e.g. MS PowerPoint)	1 (1.9%)	1 (1.9%)	22 (40.7%)	29 (53.7%)	1 (1.9%)
4	Database Application (e.g. MS Access)	26 (48.1%)	16 (29.6%)	6 (11.1%)	3 (5.6%)	3 (5.6%)
5	Multimedia presentation tools (e.g. Flash, Video).	12 (22.2%)	8 (14.8%)	6 (11.1%)	19 (35.2%)	9 (16.7%)
6	Internet, web applications.	0 (0.0%)	2 (3.7%)	2 (3.7%)	27 (50.0%)	23 (42.6%)
7	Web Authoring Tools (e.g. Dreamweaver, FrontPage).	31 (57.4%)	14 (25.9%)	5 (9.3%)	4 (7.4%)	0 (0.0%)
8	Plagiarism detection software (e.g. Turnitin).	28 (51.9%)	12 (22.2%)	4 (7.4%)	9 (16.7%)	1 (1.9%)
9	Reference software (e.g. Mendeley).	23 (42.6%)	16 (29.6%)	4 (7.4%)	9 (16.7%)	2 (3.7%)

10	Games and simulations.	20 (37.0%)	15 (27.8%)	7 (13.0%)	10 (18.5%)	2 (3.7%)
11	Learning management systems (e.g. Edmodo, Moodle).	5 (9.3%	9 (16.7%)	8 (14.8%)	20 (37.0%)	12 (22.2%)
12	Imaging Devices (e.g. Scanner, Digital Camera, and Video Camera).	2 (3.7%)	10 (15.5%)	10 (18.5%)	22 (40.7%)	10 (18.5%)
13	Computer projection device (e.g. LCD).	0 (0.0%)	2 (3.7%)	2 (3.7%)	27 (50.0%)	23 (42.6%)
14	Email or other internet communication tools for assignment/project feedback.	2 (3.7 %)	2 (3.7%)	5 (9.3%)	23 (42.6%)	33 (40.7%)
15	Teach in computer lab.	18 (33.3%)	15 (27.8%)	5 (9.3%)	7 (13.0%)	9 (16.7%)
16	Encourage students to use ICT to demonstrate learning.	1 (1.9%)	3 (5.6%)	4 (7.4%)	26 (48.1%)	20 (37.0%)
17	Encourage students to use ICT for communication.	1 (1.9%)	6 (11.1%)	5 (9.3%)	23 (42.6%)	19 (35.2%)
18	Encourage students to use ICT for collaboration.	0 (0.0%)	5 (9.3%)	6 (11.1%)	25 (46.3%)	18 (33.3%)

Below is an equation to group the result based on (Marwan, 2000). When using 1.33 interval, researchers found that value of mean below 2.34 can be classified as a 'low' response, value from 2.34 to 3.67 can be classified as a 'medium' response and value more than 3.67 until 5.00 as a 'high' response.

the scale's highest value – the scale's lowest value number of levels	=	5 – 1 3	= 1.33

Table 13 shows that overall frequency of ICT usage in teaching as medium, with mean of 3.3498 and standard deviation of 0.5558. There are 9 items that show a high level of frequency, 4 items show a medium level of frequency, and 5 items show a low level of frequency.

Table 13: Frequency of ICT Usage in Teaching

No	Items	Mean	Mode	Standard Deviation	Level of frequent usage
1	Desktop Application (e.g. MS PowerPoint)	4.5185	5	0.6656	High
2	Desktop Application (e.g. MS Word)	4.4259	5	0.7673	High
3	Internet, web applications.	4.3148	4	0.7223	High
4	Computer projection device (e.g. LCD).	4.3148	4	0.7223	High
5	Email or other internet communication tools for assignment/project feedback.	4.1296	4	0.9914	High
6	Encourage students to use ICT to demonstrate learning.	4.1296	4	0.9121	High

7	Encourage students to use ICT for collaboration.	4.0370	4	0.9104	High
8	Desktop Application (e.g. MS Excel)	4.0000	4	1.0279	High
9	Encourage students to use ICT for communication.	3.9815	4	1.0369	High
10	Imaging Devices (e.g. Scanner, Digital Camera, and Video Camera).	3.5185	4	1.1115	Medium
11	Learning management systems (e.g. Edmodo, Moodle).	3.4630	4	1.2696	Medium
12	Multimedia presentation tools (e.g. Flash, Video).	3.0926	4	1.4442	Medium
13	Teach in computer lab.	2.5185	1	1.4888	Medium
14	Games and simulations.	2.2407	1	1.2429	Low
15	Reference software (e.g. Mendeley).	2.0926	1	1.2327	Low
16	Plagiarism detection software (e.g. Turnitin).	1.9444	1	1.2040	Low
17	Database Application (e.g. MS Access)	1.9074	1	1.1536	Low
18	Web Authoring Tools (e.g. Dreamweaver, FrontPage).	1.6667	1	0.9316	Low
	Total	**3.3498**		**0.5558**	**Medium**

As mentioned earlier, researchers have been applying the frequency of ICT usage in teaching based on mean scale. The 'low' response is use if mean range below 2.34, medium' response is use if mean range between 2.34 and 3.67 and 'high' response is use if mean range more than 3.67 until 5.00. Based on table 4.12 shows the frequency of ICT usage in teaching among lecturers is medium, with the overall mean of 3.3498 and standard deviation of 0.5558. Conclusion can be made that the study sample indicates convergence because the value of standard deviation is less than 1.00.

Most of the respondents reported that they have high frequency of ICT usage in teaching when using Desktop Application (e.g. MS PowerPoint) where mean of 4.5185 and the standard deviation of 0.6656, followed by using Desktop Application (e.g. MS Word) where the mean of 4.4259 and the standard deviation of 0.7673, using the web application and internet with the mean of 4.3148 and standard deviation of 0.7223, using computer projection device (e.g. LCD) mean of 4.3148 and standard deviation of 0.7223, using email or other internet communication tools for assignment/project feedback mean of 4.1296 and standard deviation of 0.9914, Encourage students to use ICT to demonstrate learning mean of 4.1296 and standard deviation of 0.9121, using Desktop Application (e.g. MS Excel) mean of 4.0000 and standard deviation 1.0279 and encourage students to use ICT for communication mean of 3.9815 and standard deviation of 1.0369.

Besides that, most of the respondents reported that they have medium frequency of ICT usage in teaching when using imaging devices (e.g. scanner, digital camera, Video Camera) with the mean of 3.5185 and standard deviation of 1.1115, followed by using Learning management system (e.g. Edmodo, Moodle) with mean of 3.4630 and standard deviation of 1.2696, using Multimedia presentation tools (e.g. flash, video) mean of 3.0926 and standard deviation of 1.4442 and teaching in computer lab mean of 2.5185 and standard deviation of 1.4888.

Finally, most of the respondents reported that they have low frequency of ICT usage in teaching when using games and simulations with mean of 2.2407 and standard deviation of 1.2429, using reference software (e.g. Mendeley) mean of 2.0926 and standard deviation of 1.2327, using Database Application (e.g. MS Access) mean of 1.9074 and standard deviation of 1.1536, using plagiarism detection software (e.g. Turnitin) mean of

1.9444 and standard deviation of 1.2040 and using web authoring tools mean of 1.73 and standard deviation of 0.962. Overall mean of the 3.3498 and shows high frequency used ICT among lecturers.

The sixth hypothesis which is fall in research question 2 is:

H_{06}: There is no difference in frequency of ICT usage in teaching across gender of lecturers.

H_{16}: There is difference in frequency of ICT usage in teaching across gender of lecturers.

Based on Table 14 below, mean of frequency of ICT usage in teaching across gender is 3.4630 and 3.2932 respectively. Researchers refer to Independent Sample T-Test to look at whether it is significant or not significant. Levene's Test for Equality of Variances has a probability (0.672) greater than 0.05, thus researchers have assumed that the population variances are relatively equal. The two-tail significance for gender indicates that $p = 0.294$, $p > 0.05$ and therefore is NO significant. Researchers therefore ACCEPT the null hypothesis and REJECT the alternative hypothesis and conclude that there is NO difference in frequencies of ICT usage in teaching across genders of lecturers. Details are in Appendix 1.

Table 14 *:* Frequencies of ICT Usage in Teaching across Gender:

Gender	Mean	Sig.	Sig. (2-tailed)	Result
Male	3.4630	0.672	0.294	Not significant
Female	3.2932			

Based on the finding above, researcher Buabeng-Andoh (2012) support with their research there is no significant between gender and frequency of ICT usage in their institution.

The seventh hypothesis is:

H_{07}: There is no difference in frequency of ICT usage in teaching across age of lecturers.

H_{17}: There is difference in frequency of ICT usage in teaching across age of lecturers.

Based on findings, mean of frequencies of ICT usage in teaching across age of lecturers in group 1 (between 20 - 30 years old), group 2 (between 31 – 40 years old), group 3 (between 41 – 50 years old), and group 4 (more than 50 years old) are 3.2778, 3.4778, 3.1869 and 3.1667 respectively. A closer look at the mean shows that respondent's age range between 31 – 40 years old are more frequent using ICTs in teaching and respondent's age greater than 50 years old are less confident to use ICTs in teaching.

Significant level of ANOVA is 0.578, researcher ACCEPT the null hypothesis and REJECT the alternative hypothesis and conclude that there is NO difference in frequency of ICT usage in teaching across age of lecturers for the three conditions [$F (3, 66) = 0.662$, $p = 0.578$]. Details are in Appendix 1.

Table 15 : Frequencies of ICT Usage in Teaching and Age of Lecturers

Age	Mean	Std. Deviation	F	Sig.	Result
20 - 30 years	3.2778	.58002	0.882	0.457	Not significant
31 - 40 years	3.4778	.56040			
41 - 50 years	3.1869	.51296			
> 50 years	3.1667	0.			
Total	3.3498	.55583			

The eighth hypothesis is:

H_{08}: There is no difference in frequency of ICT usage in teaching across lengths of service as a lecturer.

H_{18}: There is difference in frequency of ICT usage in teaching across lengths of service as a lecturer.

Based on findings, mean of frequencies of ICT usage in teaching across lengths of service as a lecturer in group 1 (less than 3 years), group 2 (between 3 – 5 years), group 3 (between 6 – 10 years), group 4 (between 11 – 15 years), group 5 (between 16 – 20 years), and group 6 (more than 20 years) are 3.1111, 3.2315, 3.3773. 3.5556, 3.0741 and 3.1667 respectively. A closer look at the means shows that respondent's length of service as a lecturer between 11 - 15 years are more frequent to use ICTs in teaching and respondent's length of service as a lecturer more than 20 years are less frequent to use ICTs in teaching.

Significant level of ANOVA is 0.541, researcher ACCEPT the null hypothesis and REJECT the alternative hypothesis and conclude that there is NO difference in frequency of ICT usage in teaching across lengths of service as a lecturer for the three conditions [F (5, 48) = 0.821, p = 0.541]. Details are in Appendix 1.

Table 16 : Frequencies of ICT Usage in Teaching across Lengths of Service as a Lecturers

Age	Mean	Std. Deviation	F	Sig.	Result
< 3 years	3.1111	.63148	0.821	0.541	Not significant
3 - 5 years	3.2315	.60289			
6 - 10 years	3.3773	.58359			
11 - 15 years	3.5556	.48432			
16 - 20 years	3.0741	.44905			
> 20 years	3.1667	.47140			
Total	3.3498	.55583			

Research conducted by **Buabeng-Andoh (2012)** found there is no significant between teaching experiences and frequency of ICT usage in their institution.

The ninth hypothesis is:

H_{09}: There is no difference in frequency of ICT usage in teaching across duration of ICT used in teaching.

H_{19}: There is difference in frequency of ICT usage in teaching across duration of ICT used in teaching.

Based on findings, mean of frequency of ICT usage in teaching across duration of ICT used in teaching group 1 (less than 3 years), group 2 (between 3 – 5 years), group 3 (between 6 – 10 years), and group 4 (more than 10 years) are 3.1111, 3.1838, 3.4167, and 3.5278 respectively. A closer look at the means shows that respondent's duration of ICTs used as a lecturer more than 10 years are more frequent to use ICTs in teaching and respondent's duration of ICTs used as a lecturer less than 3 years are less frequent to use ICTs in teaching.

Significant level of ANOVA is 0.246, researchers ACCEPT the null hypothesis and REJECT the alternative hypothesis and conclude that there is NO difference in frequency of ICT usage in teaching across duration of ICT used in teaching for the three conditions [F (3, 50) = 1.425, p = 0.246].

Table 17 : Frequencies of ICT Usage in Teaching across Duration of ICT Used as a Lecturers

Age	Mean	Std. Deviation	F	Sig.	Result
< 3 years	3.1111	.64709	1.425	0.246	Not significant
3 - 5 years	3.1838	.41412			

6 - 10 years	3.4167	.64146			
> 10 years	3.5278	.45539			
Total	3.3498	.55583			

The tenth hypothesis is:

H_{10}: There is no difference in frequency of ICT usage in teaching across academic department.

H_{10}: There is difference in frequency of ICT usage in teaching across academic department.

Based on findings, mean of frequencies of ICT usage in teaching across academic department in group 1 (Quantitative Science), group 2 (Accounting), group 3 (Business Management), and group 4 (Liberal Study) are 3.6581, 3.2389, 3.4829 and 3.0926 respectively. A closer look at the mean shows that respondent's from Quantitative Science Department are more frequent to use ICTs in teaching and respondent's from Liberal Study are less frequent to use ICTs in teaching.

Significant level of ANOVA is 0.024, researchers REJECT the null hypothesis and ACCEPT the alternative hypothesis and conclude that there are significant differences in frequencies of ICT usage in teaching across academic department for the three conditions [F (3, 50) = 3.408, p = 0.024].

Table 18 : Frequencies of ICT Usage in Teaching across Academic Department.

Academic Department	Mean	Std. Deviation	F	Sig.	Result
Quantitative Science	3.6581	0.59050	3.408	0.024	Significant
Accounting	3.2389	0.54184			
Business Management	3.4829	0.43708			
Liberal Study	3.0926	0.51308			
Total	3.3498	0.55583			

Based on the finding, researcher can conclude that the most appropriate ICTs tools for teaching depending on the high level of frequency use. Researchers have been applied the frequency used based on mean scale. The 'low' response is use if mean range below 2.34, medium' response is use if mean range between 2.34 and 3.67 and 'high' response is use if mean range more than 3.67 until 5.00.

Most of the respondents highly used Desktop Application (MS PowerPoint) mean of 4.5185 and mode 5, Desktop Application (MS Word) mean of 4.4259 and mode of 5, internet and web applications mean of 4.3148 and mode of 4, Computer projection device (LCD) mean of 4.3148 and mode of 4, email or other internet communication tool for assignment / project feedback mean of 4.1296 and mode of 4, encourage students to use ICT to demonstrate learning mean of 4.1296 and mode of 4, encourage students to use ICT for collaboration mean of 4.0370 and mode of 4, Desktop Application (MS Excel) mean of 4.0000 and mode of 5 and Encourage students to use ICT for communication mean of 3.9815 and mode of 4.

Besides that, researchers found that based on the findings, conclusions can be made about which ICT tools currently highly used by KPMSI lecturer. There are nine ICT tools listed as shown in Table 4.19. All ICT tools mentioned are commonly used by the lecturer in their teaching. For example, in KPMSI, all lecturers encourage to use slide presentation to deliver their subject content, communicate with leaner through email or learning management system as a platform to reduce paper usage. Besides that, learners are well accepted the ICT usage because all of them are from young generation.

Table 19 : Types of ICT Tools Currently Highly Being Used by Lecturers

No	Items	Mean	Mode	Level of frequent usage
1	Desktop Application (e.g. MS PowerPoint)	4.5185	5	High
2	Desktop Application (e.g. MS Word)	4.4259	5	High
3	Internet, web applications.	4.3148	4	High
4	Computer projection device (LCD).	4.3148	4	High
5	Email or other internet communication tools for assignment/project feedback.	4.1296	4	High
6	Encourage students to use ICT to demonstrate learning.	4.1296	4	High
7	Encourage students to use ICT for collaboration.	4.0370	4	High
8	Desktop Application (e.g. MS Excel)	4.0000	4	High
9	Encourage students to use ICT for communication.	3.9815	4	High

Figures below show the frequency of respondents using ICT tools in their teaching focusing on the first nine ICT tools currently highly being used by KPMSI lecturer.

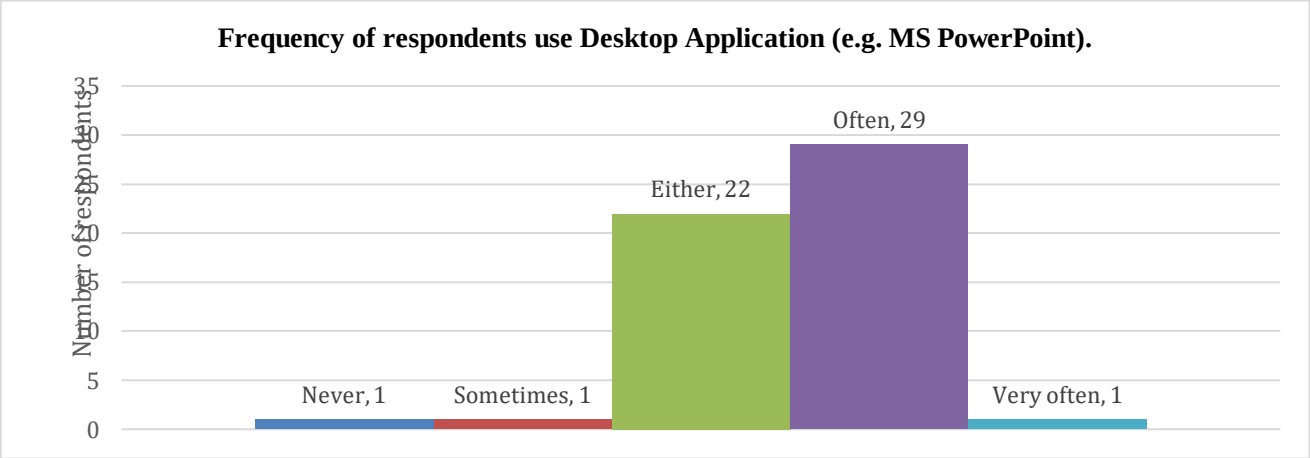

Fig 7 : Frequency of respondents using Desktop Application (e.g. MS PowerPoint).

Based on fig 7, it shows high frequency of respondents using Desktop Application (e.g. MS PowerPoint). There is 1 respondent reported that they never use Desktop Application (e.g. MS PowerPoint) in their teaching, 1 respondent (1.9%) reported that they were sometimes, 22 respondents (40.7%) reported that they were Neither, 29 respondents (53.7%) reported that they were often and 1 respondents (1.9%) reported that they were very often used Desktop Application (e.g. MS PowerPoint) in their teaching.

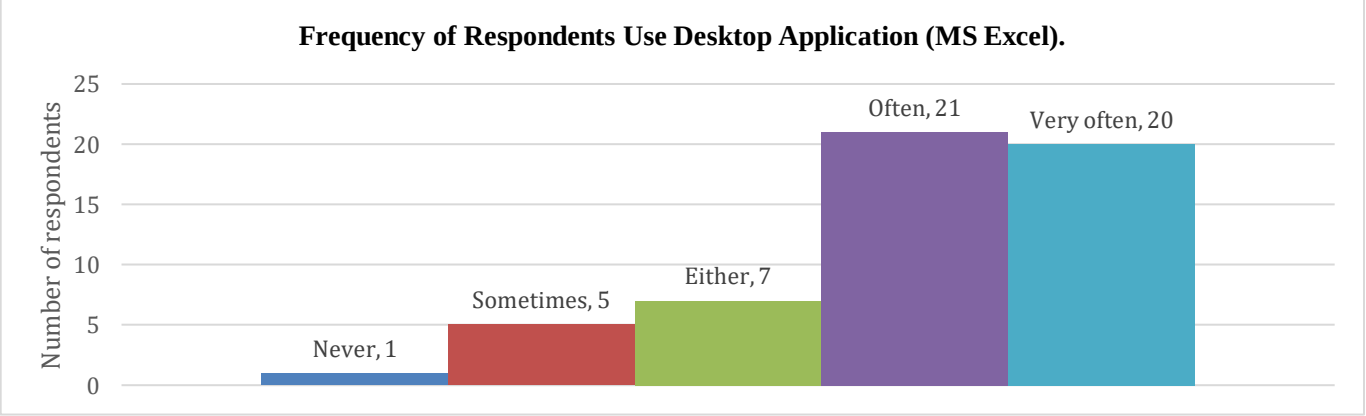

Fig *8 :* Frequency of Respondents Use Desktop Application (MS Excel).

Based on fig 8, it shows high frequency of respondents using Desktop Application (MS Excel). Only 1 respondent (1.9%) reported that they were never used, 5 respondents (9.3%) reported that they were sometimes using Desktop Application (MS Excel), 7 respondents (13.0%) reported that they were Neither, 21 respondents (38.9%) reported that they were often, and 20 respondents (37.0%) reported that they were very often used Desktop Application (MS Excel).

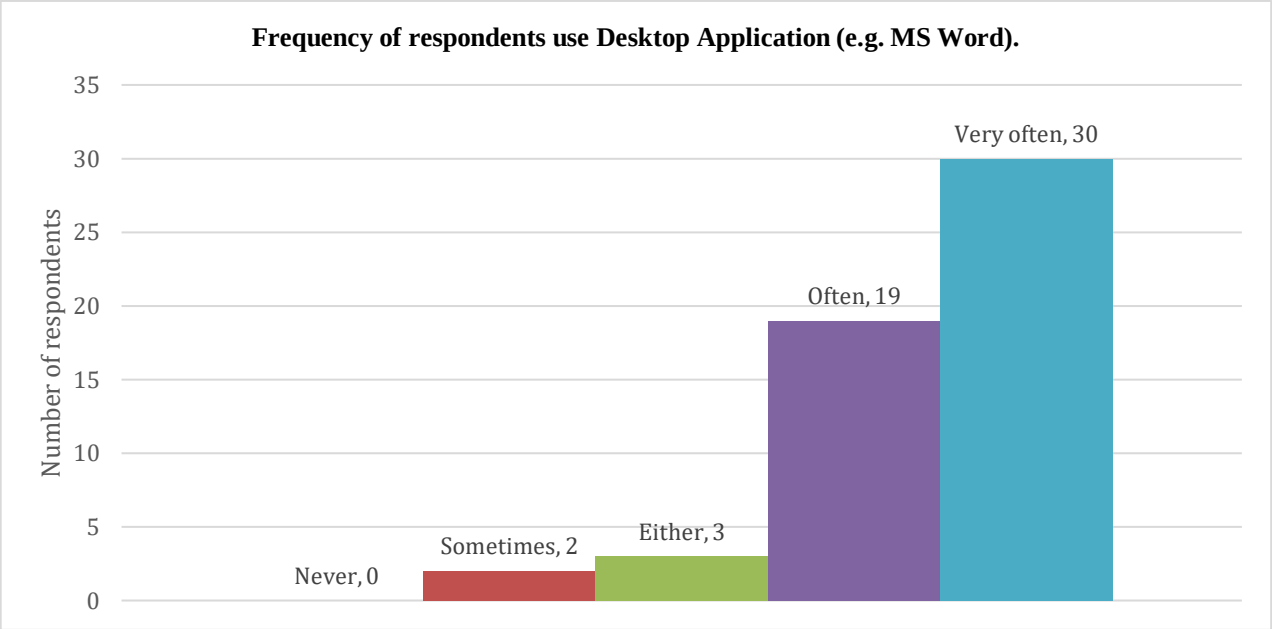

Fig 9 : Frequency of respondents using Desktop Application (e.g. MS Word)

Based on Fig 9, it shows high frequency of respondents using Desktop Application (MS Word). No respondent reported that they never use Desktop Application (MS Word), 2 respondents (3.7%) reported that they sometimes use Desktop Application (MS Word) in their teaching, 3 respondents (5.6%) reported that they were neither, 19 respondents (35.2%) reported that they were often and 30 respondents (55.6%) reported that they were very often used Desktop Application (MS Word) in their teaching.

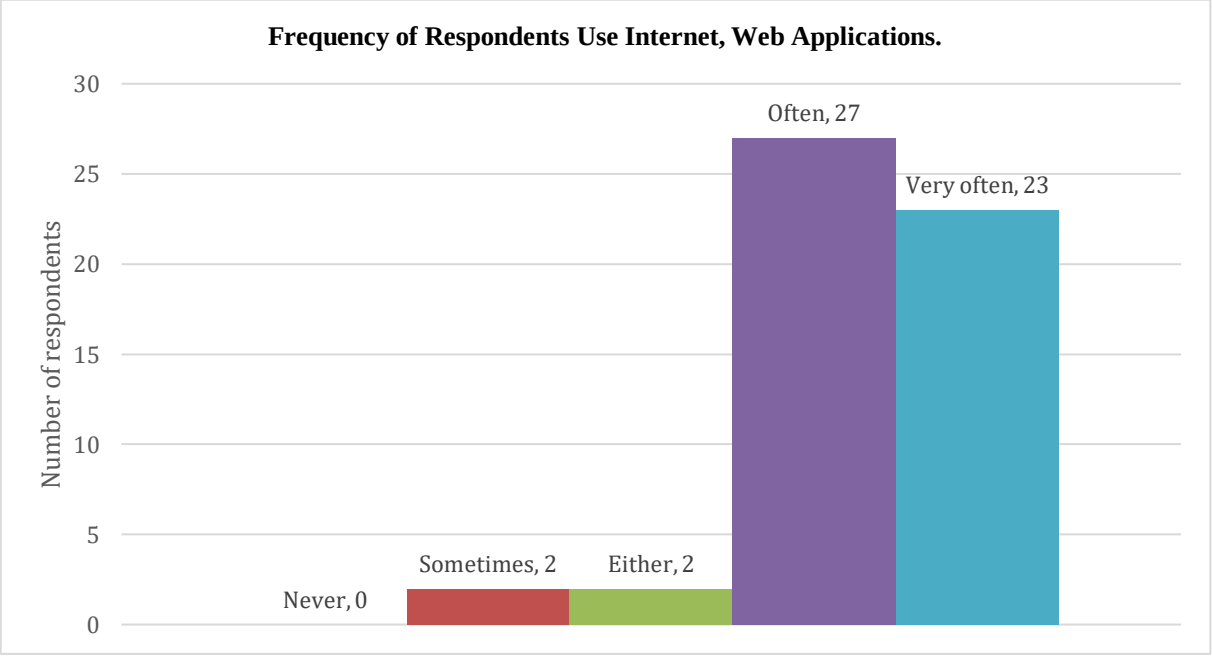

Fig 10 : Frequency of respondents using Internet and web applications

Based on fig 10, it shows high frequency of respondents using Internet and web applications. No respondents reported that they never use internet or web applications. 2 respondents (3.7%) reported that they sometimes

use Internet and web applications in their teaching, 2 respondents (3.7%) reported that they were Neither, 27 respondents (50.0%) reported that they were often, and 23 respondents (42.6%) reported that they were very often used Internet and web applications in their teaching.

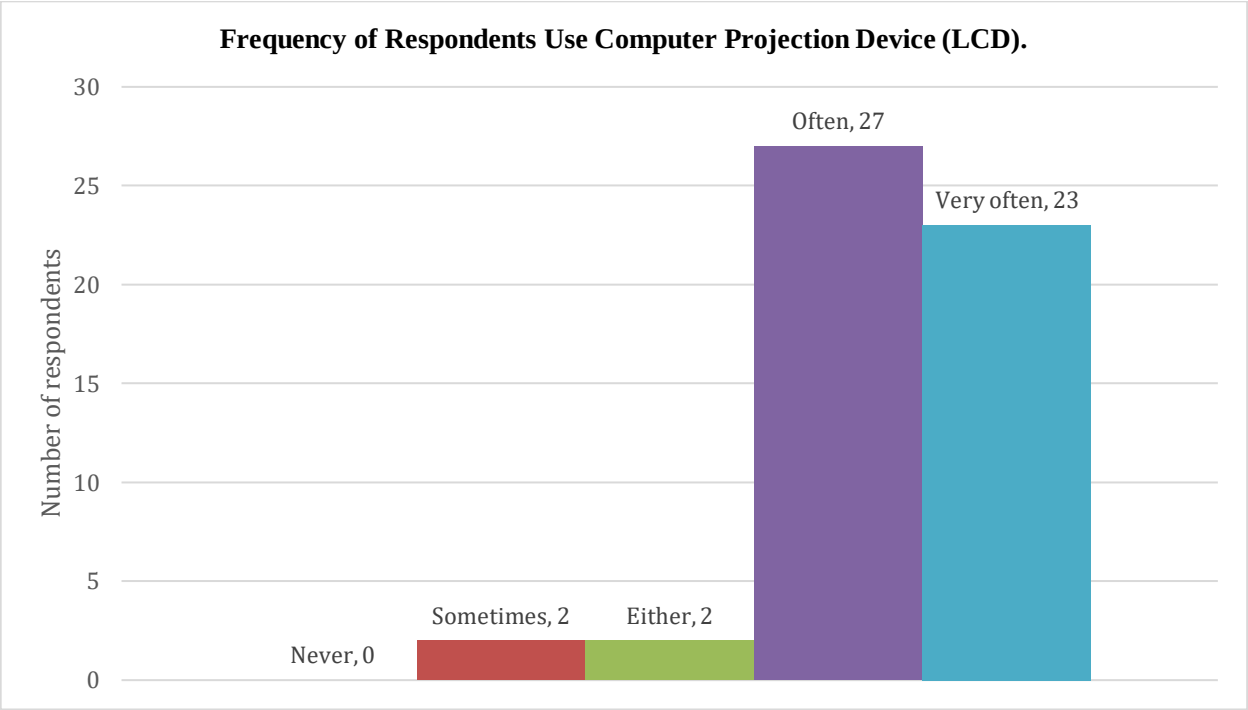

Fig 11 : Frequency of Respondents Use Computer Projection Device (e.g. LCD).

Based on fig 11, it shows high frequency of respondents using computer projection device (LCD). No respondent reported that they never use computer projection device (e.g. LCD), 2 respondents (3.7%) reported that they were sometimes use computer projection device (LCD) in their teaching, 2 respondents (3.7%) reported that they were Neither, 27 respondents (50.0%) reported that they were often and 23 respondents (42.6%) reported that they were very often used computer projection device (LCD) in their teaching.

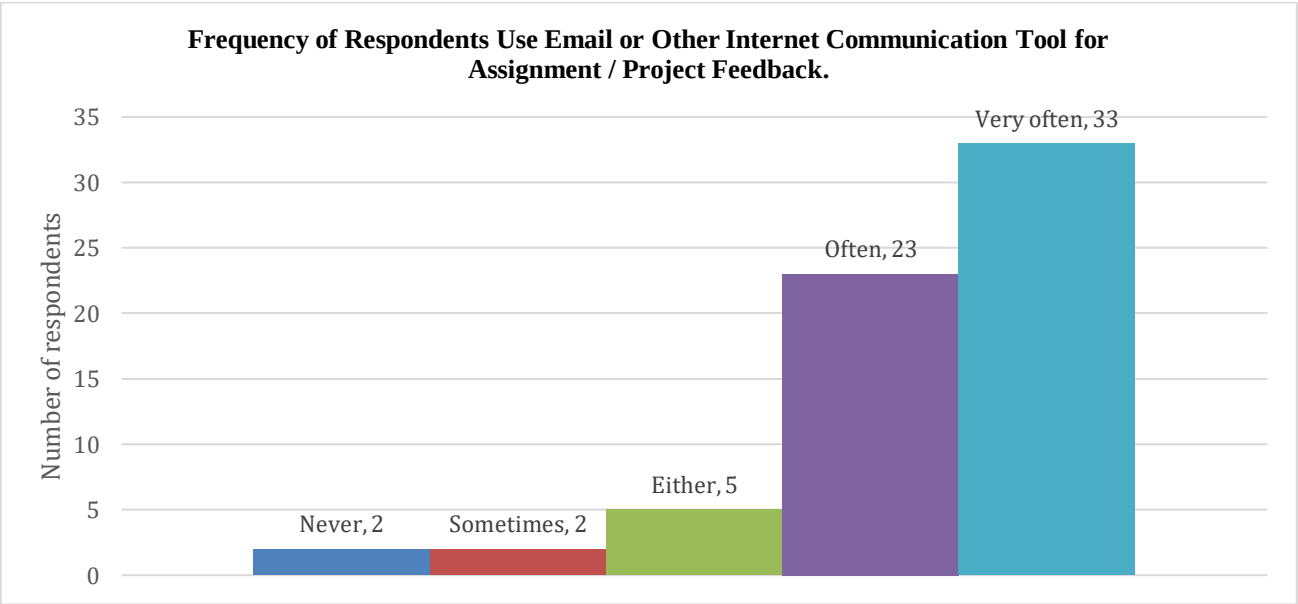

Fig 12 : Frequency of Respondents Use Email or Other Internet Communication Tool for Assignment / Project Feedback.

Based on fig 12, it shows high frequency of respondents using email or other Internet communication tool for assignment/project feedback. Only 2 respondents (3.7%) reported that they were never use, 2 respondents

(3.7%) reported that they were sometimes use email or other Internet communication tool for assignment/project feedback in their teaching, 5 respondents (9.3%) reported that they were Neither, 23 respondents (42.6%) reported that they were often and 33 respondents (40.7%) reported that they were very often used email or other Internet communication tool for assignment/project feedback in their teaching.

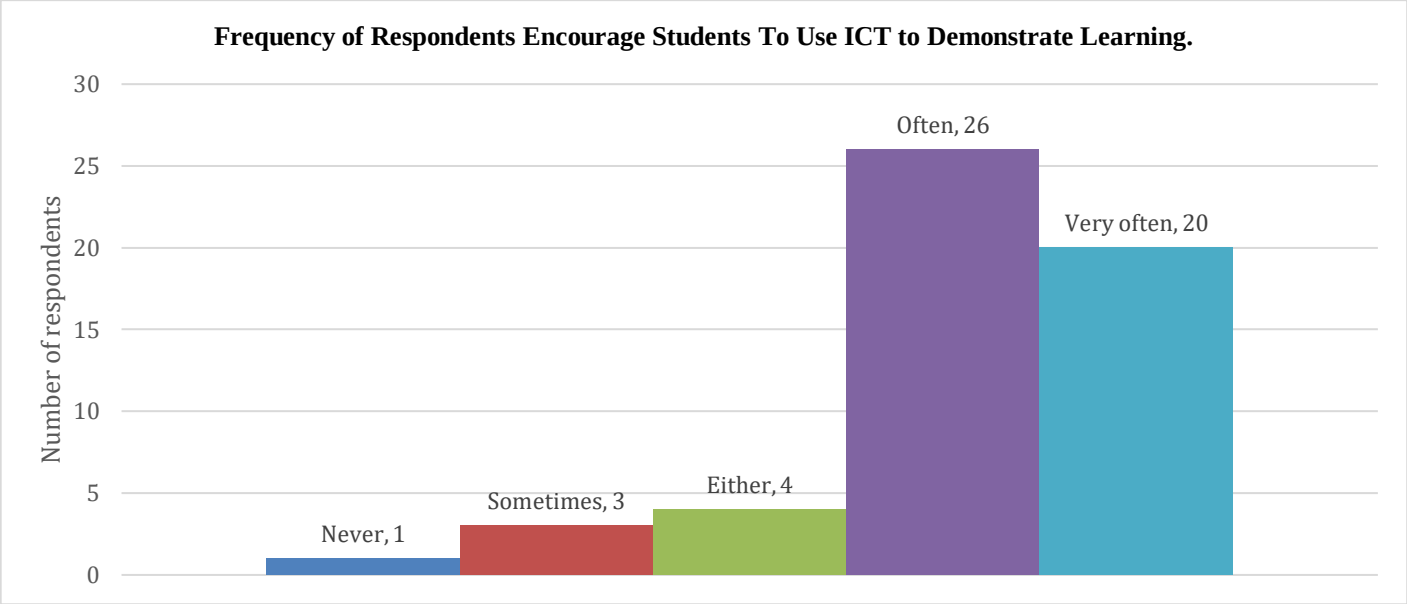

Fig 13 : Frequency of Respondents Encourage Students to Use ICT to Demonstrate Learning.

Based on fig 13, it shows high frequency of respondents encourage students to use ICT to demonstrate learning, 1 respondents (1.9%) reported that they never encourage students to use ICT to demonstrate learning, 3 respondents (5.6%) reported that they sometimes, 4 respondents (7.4%) reported that they were Neither, 26 respondents (48.1%) reported that they were often and 20 respondents (37.0%) reported that they were very often encourage students to use ICT to demonstrate learning.

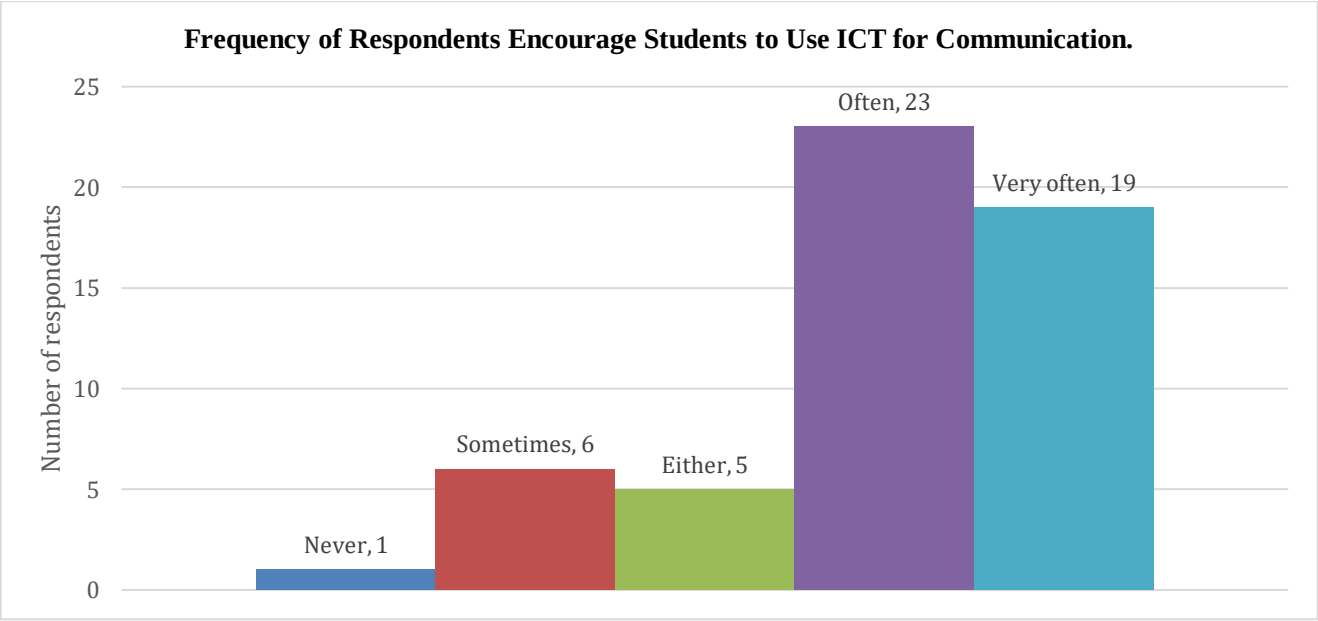

Fig 14 : Frequency of Respondents Encourage Students to Use ICT for Communication.

Based on fig 14, it shows high frequency of respondents encourage students to use ICT for communication, 1 respondents (1.9%) reported that they never encourage students to use ICT to demonstrate learning, 6 respondents (11.1%) reported that they sometimes, 5 respondents (9.3%) reported that they were Neither, 23 respondents (42.6%) reported that they were often and 19 respondents (35.2%) reported that they were very often encourage students to use ICT for communication.

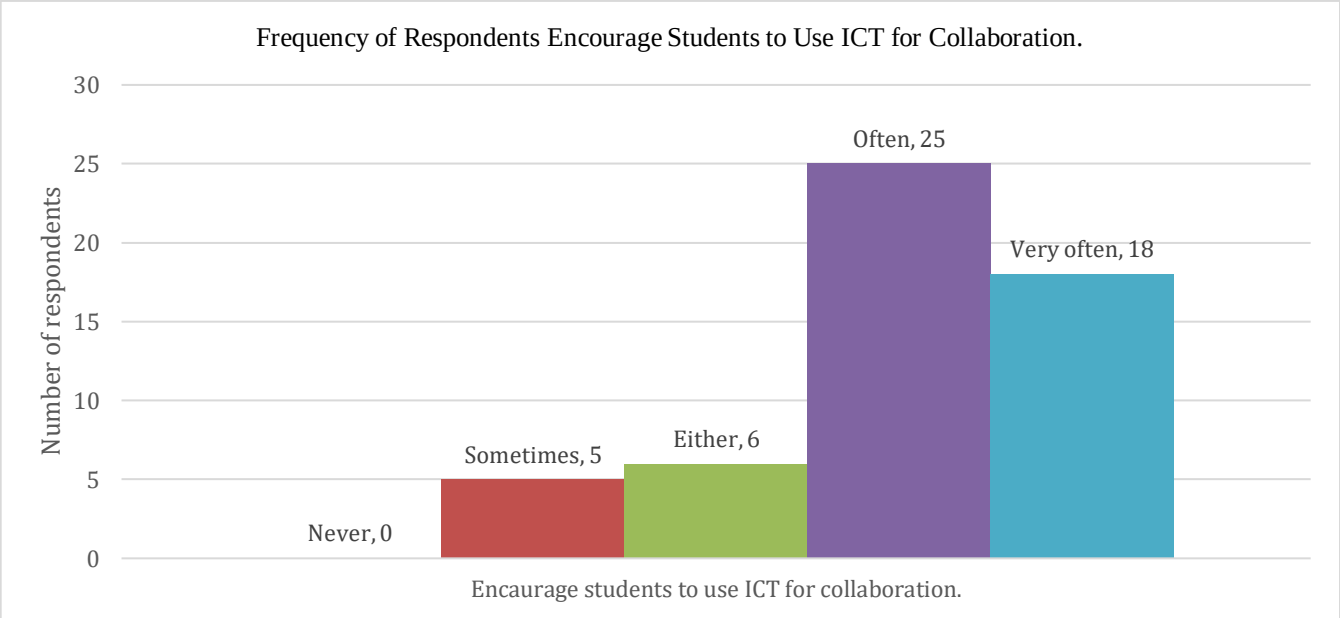

Fig 15 : Frequency of Respondents Encourage Students to Use ICT for Collaboration.

Based on fig 15, it shows high frequency of respondents encourage students to use ICT for collaboration, no respondent reported that they never encourage students to use ICT for collaboration, 5 respondents (9.3%) reported that they sometimes, 6 respondents (11.1%) reported that they were neither, 25 respondents (46.3%) reported that they were often and 18 respondents (33.3%) reported that they were very often encourage students to use ICT for collaboration.

Result from the finding shows that there are several ICT tools that lecturers currently being used in their teaching such as Desktop Application namely MS Word, MS Excel, and MS PowerPoint, internet and web application. Besides that, email, multimedia presentation tools such as Flash and video), Learning Management System such as Edmodo and Moodle, imaging devices such as scanner, digital camera and video camera and computer projection devices (LCD) have also been used.

Most frequent ICT tools used by lecturers are word processing and internet search. Most of the lecturers in their institution often or very frequently assign internet search. Moreover, findings from Hue & Jalil (2013) found that based on their research, lecturers responses of frequently use ICT in teaching often used web browser, computer projection devices, email and multimedia presentation such as Desktop Application (Microsoft PowerPoint). In addition, games and simulation, web publishing tools are not frequently used by the lecturer.

Frequency of ICT use can be influenced by using word processing, email, internet for information searching, and spreadsheet. Based on the findings, there are five ICT tools that are low frequency used by lecturers in teaching. These five ICT tools should come up with suitable training depending on lecturers needed. Table 4.20 shows the mean, mode and low level of frequently used ICT tools by lecturers. There are five ICT tools most of the respondents' reported that they have low level of usage such as games and simulations mean of 2.2407 and mode of 1, reference software (e.g. Mendeley) mean of 2.0926 and mode of 1, plagiarism detection software (e.g. Turnitin) mean of 1.9444 and mode of 1 database application (e.g. MS Access) mean of 1.9074 and mode of 1, and web authoring tools (Dreamweaver, FrontPage) mean of 1.6667 and mode of 1.

Table 20 *:* List of Low Frequency of ICT Tools Used in Teaching

No	Items	Mean	Mode	Level of frequent usage
1	Games and simulations.	2.2407	1	Low
2	Reference software (e.g. Mendeley).	2.0926	1	Low

3	Plagiarism detection software (e.g. Turnitin).	1.9444	1	Low
4	Database Application (e.g. MS Access)	1.9074	1	Low
5	Web Authoring Tools (e.g. Dreamweaver, FrontPage).	1.6667	1	Low

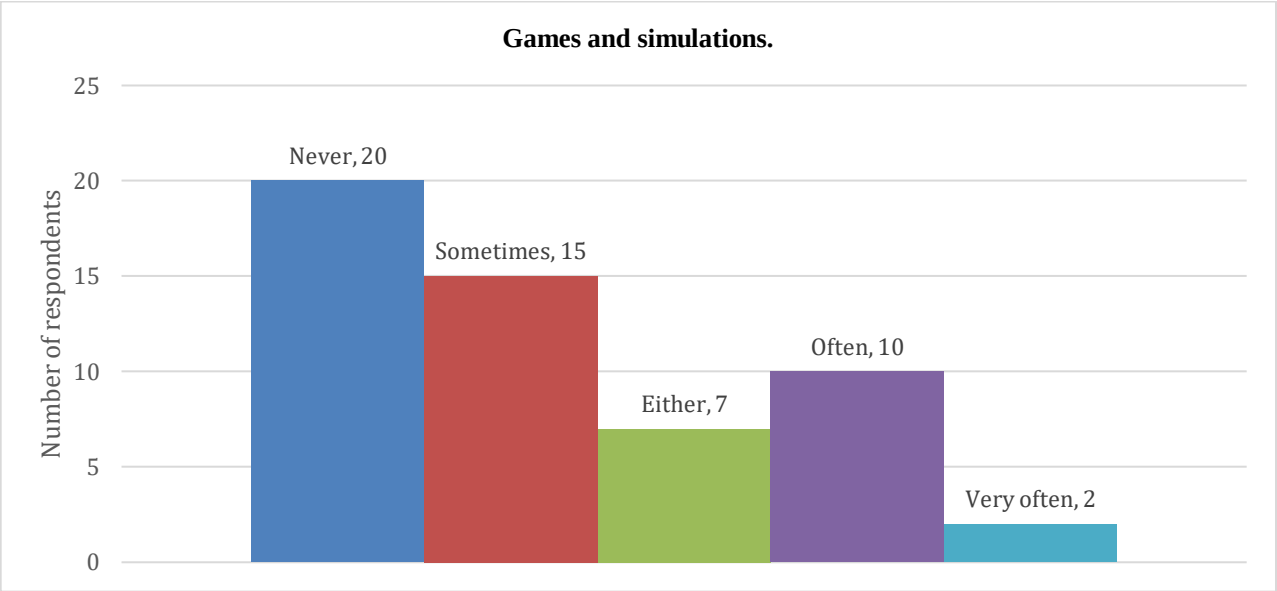

Fig*16 :* Frequency of Respondents Use Games and Simulations.

Based on fig 16, it shows low frequency of respondents using games and simulations. 20 respondents (37.0%) reported that they never use games and simulations in their teaching, 15 respondents (27.8%) reported that they were sometimes, 7 respondents (13.0%) reported that they were neither, 10 respondents (18.5%) reported that they were often and only 2 respondents (3.7%) reported that they were very often used games and simulations in their teaching.

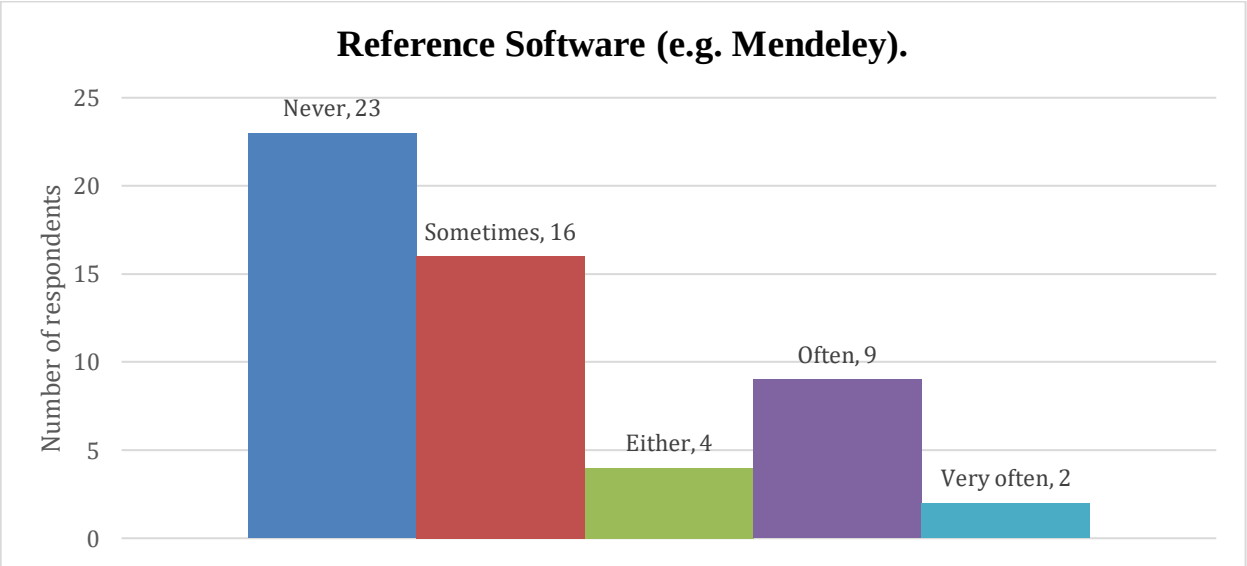

Fig 17 : Frequency of Respondents Use Reference Software (e.g. Mendeley).

Based on fig 17, it shows low frequency of respondents using reference software (e.g. Mendeley). 23 respondents (42.6%) reported that they never use reference software (Mendeley) in their teaching, 16 respondents (29.6%) reported that they were sometimes, 4 respondents (7.4%) reported that they were neither, 9 respondents (16.7%) reported that they were often and only 2 respondents (3.7%) reported that they were very often used reference software (e.g. Mendeley) in their teaching.

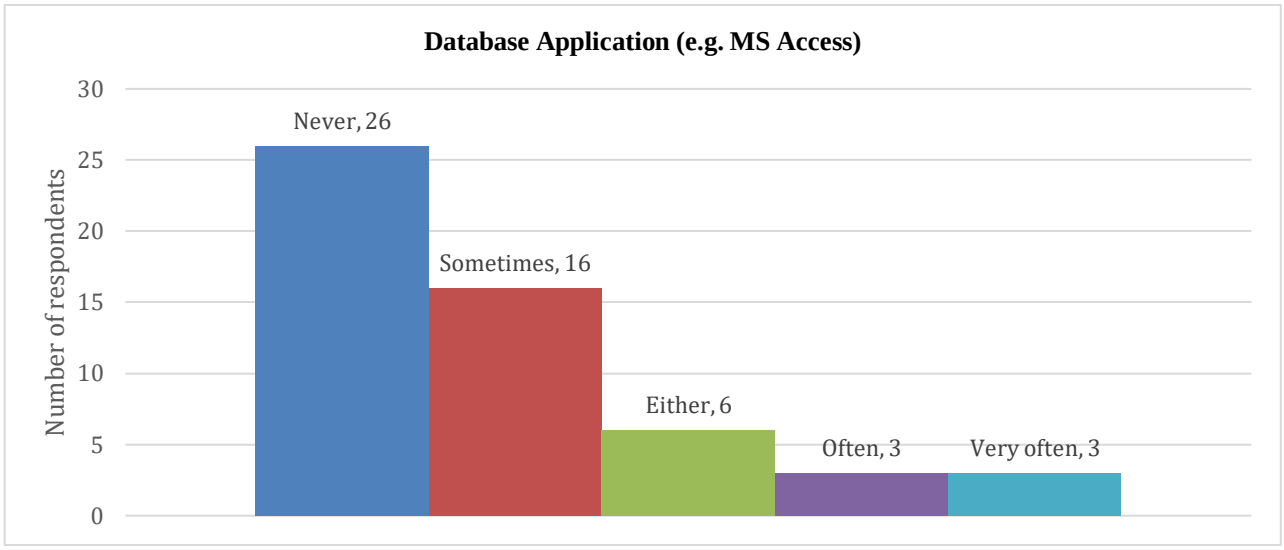

Fig 18 : Frequency of Respondents Use Database Application (e.g. MS Access).

Based on fig 18, it shows low frequency of respondents using Database Application (e.g. MS Access). 26 respondents (48.1%) reported that they never use Database Application (MS Access) in their teaching, 16 respondents (29.6%) reported that they were sometimes, 6 respondents (11.1%) reported that they were Neither, 3 respondents (5.6%) reported that they were often, and 3 respondents (5.6%) reported that they were very often used Database Application (MS Access) in their teaching.

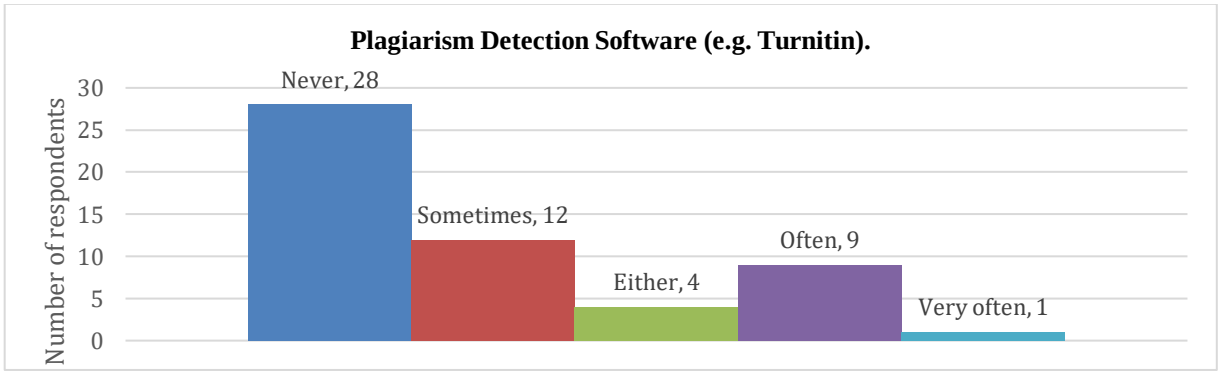

Fig 19 : Frequency of Respondents Use Plagiarism Detection Software (e.g. Turnitin).

Based on fig 19, it shows low frequency of respondents using plagiarism detection software (e.g. Turnitin). 28 respondents (51.9%) reported that they were never use plagiarism detection software (e.g. Turnitin) in their teaching, 12 respondents (22.2%) reported that they were sometimes, 4 respondents (7.4%) reported that they were neither, 9 respondents (16.7%) reported that they were often and 1 respondents (1.9%) reported that they were very often used plagiarism detection software (e.g. Turnitin) in their teaching.

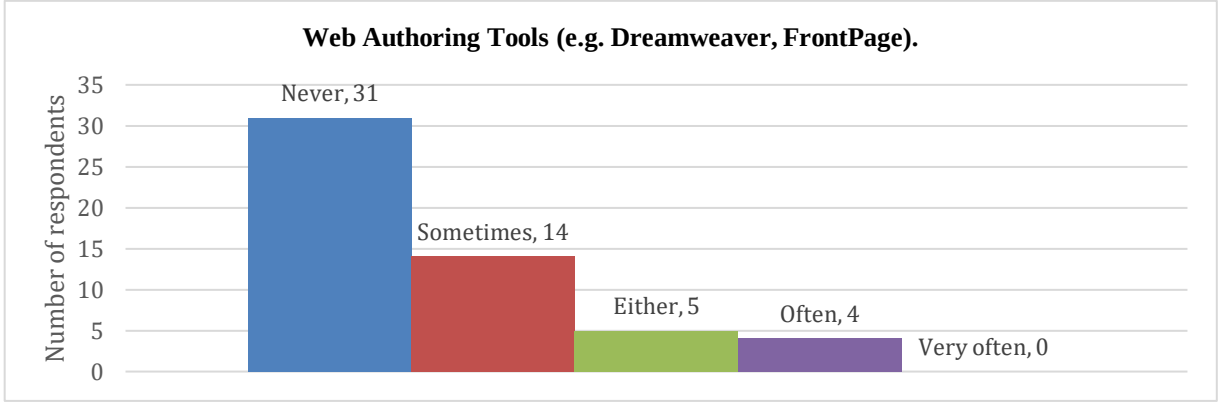

Fig 20 : Frequency of Respondents Use Web Authoring Tools (e.g. Dreamweaver, FrontPage).

Based on fig 20, it shows low frequency of respondents using web authoring tools (Dreamweaver, FrontPage). 31 respondents (57.4%) reported that they were never use web authoring tools (e.g. Dreamweaver, FrontPage) in their teaching, 14 respondents (25.9%) reported that they were sometimes, 5 respondents (9.3%) reported that they were Neither, 4 respondents (7.4%) reported that they were often and none of the respondents reported that they were very often used web authoring tools (e.g. Dreamweaver, FrontPage) in their teaching.

Supporting research conducted by Alazam et al. (2012), researchers said most of the lecturers from their institution need to attend courses related to website tools, multimedia, programming and database. According to Hsu (2011), researchers recognize that lecturers should join training related to the skills they were not master regarding ICT tools. Supported by Copriady (2014), lecturers should provide sufficient training related to ICT tools for technology advantage so that they can run and use ICT smoothly in their teaching. Several ICT tools not familiar by the lecturers found by Hue & Jalil (2013) ICT tools such as games and simulation, web publishing tools rarely used in their teaching.

Research Question 3 and Research Objective 3

RQ3: How do ICT usage confidence and frequency of use affect teaching efficiency?

RO3: To examine the relationship between ICT usage confidence, frequency of ICT usage, and teaching efficiency.

The results demonstrated significant positive correlations between both ICT usage confidence and teaching efficiency, and between frequency of ICT use and teaching efficiency. This indicates that lecturers who are more confident and who use ICT more frequently tend to perceive higher efficiency in their teaching practices.

Research Question 3 – How does the usage of ICT in teaching can be affected by ICT usage confidence score and the frequency of ICT usage in teaching?

Research Objective 3 – To identify the relationship between ICT usage confidence score, frequency of ICT usage and efficiency using ICT in teaching.

To explore the opinion about efficiency of using ICT among lecturers, descriptive statistics were conducted. The scale used of 1 = Strongly Disagree, 2 = Disagree, 3 = Neither, 4 = Agree, 5 = Strongly Agree. The respondent was required to check their opinion of efficiency using ICT in teaching across 17 items. Table 4.21 shows the items involved.

Based on the finding from table 4.21, researchers conclude that all lecturers in KPMSI agree with the efficiency of ICT usage in teaching except ICT takes time away from actual classroom instruction with mean of 2.2963 and using ICT, teaching become slow for various reasons with mean of 2.3519. Most of the respondents disagree that their efficiency will be reduced if they use the ICT in teaching.

Table *21*: Efficiency of using ICT in teaching

No	Item	Mean	Mode
1.	ICT helps me to get more involved in teaching.	4.4259	5.00
2.	ICT is an important aspect of teaching career.	4.3889	5.00
3.	ICT can be integrated to foster effective teaching and learning environment.	4.5370	5.00
4.	ICT can be a positive change agent in student learning.	4.4444	5.00
5.	ICT provides greater access to learning resources.	4.5000	5.00
6.	ICT makes teaching and learning more exciting.	4.5000	5.00
7.	ICT makes teaching and learning more interactive.	4.5556	5.00

8.	ICT improves communication between students and lecturer.	4.3333	4.00
9.	ICT disrupts teaching especially if the computer system crashes or there is general computer network congestion.	4.1852	5.00
10.	ICT assist lecturers to find extra information for teaching purposes through World Wide Web (www).	4.4259	5.00
11.	ICT takes time away from actual classroom instruction.	2.2963	2.00
12.	Using ICT, my teaching becomes slow for several reasons.	2.3519	2.00
13.	ICT enhances my role as a lecturer.	4.4444	5.00
14.	ICT makes me feel more professional.	4.5185	5.00
15.	ICT positively changes the learning climate in my classroom.	4.4259	5.00
16.	ICT positively changes the relationship between me and my students.	4.2593	5.00
17.	ICT positively changes the usual relationship between students in my classroom.	4.3148	5.00

Next step is to do correlation analysis. The purpose of this analysis is to find the strength of the relationship between the variables tested and to discover whether there is a relationship between variables. Because this kind of relationship allows researchers to predict how one kind of behavior will produce another.

Correlation Analysis

Correlation analysis confirmed strong relationships between ICT confidence and teaching efficiency, as well as between frequency of use and teaching efficiency. These findings are consistent with global studies showing that confidence and frequent use of ICT are strong predictors of effective teaching (Kimmons, 2020; González et al., 2021). At an analytical level, the correlations suggest that ICT confidence and frequency reinforce each other. Lecturers who use ICT frequently tend to build confidence, which further motivates deeper integration of ICT in teaching. This cyclical relationship emphasizes the importance of fostering both confidence and habitual use simultaneously.

Before regression equation running to test the hypothesis, dependence variable of efficiency using ICTs in the teaching and independence variables of confidence score of ICT usage in teaching and frequency of ICT usage in teaching were examined using bi-variate correlations.

The eleventh hypothesis is:

H_{11}: There is no relationship between confidence score of ICT usage and efficiency of using ICT in teaching.

H_{111}: There is relationship between confidence score of ICT usage and efficiency of using ICT in teaching.

The twelfth hypothesis is:

H_{12}: There is no relationship between frequency of ICT usage in teaching and efficiency of using ICT in teaching.

H_{112}: There is relationship between frequency of ICT usage in teaching and efficiency of using ICT in teaching.

Table 22 shows the Descriptive Statistics section which gives the meaning, standard deviation, and number of observations (N) for each of the variables that have been specified. Firstly, the ICT usage confidence variable is 3.8519, the standard deviation of the score is 0.49408. Secondly, frequency of ICT usage in teaching variable is 3.3498, the standard deviation of the score 0.55583. Lastly, the meaning of the efficiency in the teaching variable is 4.1710, the standard deviation of the score is 0.42376 and there were 54 observations (N) for each of the 3 variables.

Table 22: Descriptive Statistics between ICT Usage Confidence Score, Frequency of ICT Usage in Teaching & Efficiency of Using ICT in Teaching

Descriptive Statistics			
ICTs tools	Mean	Std. Deviation	N
ICT usage confidence score	3.8519	0.49408	54
Frequency of ICT usage in teaching	3.3498	0.55583	54
Efficiency of using ICT in teaching	4.1710	0.42376	54

Table 23 shows the Pearson correlation coefficient between ICT usage confidence score and efficiency in the ICT usage in teaching is 0.399 and p-value = 0.003. The middle number is the significance of the correlation; it is 0.003 ($p<0.05$). The bottom number, 54 is the number of observations that were used to calculate the correlation coefficient. Researchers conclude that the correlation coefficient is significant ($p < 0.05$) and the strength of association between ICTs usage confidence score and Efficiency of using ICT in teaching is moderate ($r = 0.399$).

Table 23 : Correlation coefficient between ICT usage confidence score, frequency of ICT usage in teaching and efficiency of teaching

		ICT usage confidence score	Frequency of ICT usage in teaching	Efficiency of using ICT in teaching
ICT usage confidence score	Pearson Correlation	1	.729**	.399**
	Sig. (2-tailed)		.000	.003
	N	54	54	54
Frequency of ICT usage in teaching	Pearson Correlation	.729**	1	.469**
	Sig. (2-tailed)	.000		.000
	N	54	54	54
Efficiency of using ICT in teaching	Pearson Correlation	.399**	.469**	1
	Sig. (2-tailed)	.003	.000	
	N	54	54	54
**. Correlation is significant at the 0.01 level (2-tailed).				

Besides that, Pearson correlation coefficient between frequency of ICT usage in teaching (IV) and efficiency of teaching (DV) is 0.469 and p-value =0.000. The middle number is the significance of the correlation; it is 0.000 ($p<0.05$). The bottom number, 54 is the number of observations that were used to calculate the correlation coefficient. Researchers conclude that the correlation coefficient is significant ($p < 0.05$) and the strength of association between frequencies of ICT usage in teaching and efficiency using ICTs in the teaching is moderate ($r = 0.469$).

Regression analysis revealed that ICT usage confidence was a significant predictor of teaching efficiency. The model showed that higher confidence scores contributed directly to perceived efficiency, even when controlling demographic variables. This supports previous findings that self-efficacy is a powerful determinant of technology integration (Schunk & DiBenedetto, 2020). For KPMSI, the implication is clear: targeted

confidence-building interventions, such as hands-on workshops and peer mentoring, are likely to yield measurable improvements in teaching outcomes.

Regression Analysis of the ICT Usage Confidence Score with the Efficiency of using ICT in Teaching.

The thirteenth hypothesis is:

H_{13}: ICT usage confidence score does not affect the efficiency using ICTs in the teaching.

H_{113}: ICT usage confidence score affects the efficiency using ICTs in teaching.

From table 24, $R^2 = 0.159$ (or 15.9%). This shows that 15.9% of total variance of efficiency using ICT in teaching (Y) is explained by the ICT usage confidence score (X1).

Table 24 : Model Summary of ICT Usage Confidence Score and Efficiency using ICT in Teaching.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.399[a]	0.159	0.143	0.39239
a. Predictors: (Constant), ICT usage confidence score (IV)				
b. Dependent Variable: Efficiency of using ICT in teaching (DV)				

In the ANOVA table 25, p-value associated for this F-statistic is 0.003. Therefore, researchers conclude that the current regression equation meaningfully explains the relationship between efficiency using ICT in the teaching (Y) and the ICT usage confidence score (X1).

Table 25 : Anova[a] of ICT Usage Confidence Score and Efficiency of Using ICT in Teaching.

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.515	1	1.515	9.843	.003[b]
	Residual	8.003	52	.154		
	Total	9.517	53			
a. Dependent Variable: Efficiency of using ICT in teaching						
b. Predictors: (Constant), ICT usage confidence score						

From the coefficient Table 26, researcher observe that the estimated regression coefficients are: β0 (Constant) = 2.853 and β1= 0.342. Researchers reject the null hypothesis (H_{13}: β1=0) and researcher conclude that efficiency of teaching (Y) is significantly affected by the ICT usage confident level (X1), since p-value = 0.000 < 0.05. Researchers expect that the efficiency of teaching (Y) will increase by 0.460 units if ICT usage confidence score (X1) increased by 1 unit. Based on the estimated regression equation Y=2.853+0.342*X1.

Table 26 : Coefficients of ICT Usage Confidence Score and Efficiency of using ICT in Teaching.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.853	.423		6.737	.000
	ICT usage confidence score	.342	.109	.399	3.137	.003
a. Dependent Variable: Efficiency using ICT in teaching						

The normal plot Figure 17 of regression standardized residuals for dependent variable indicates a relatively normal distribution.

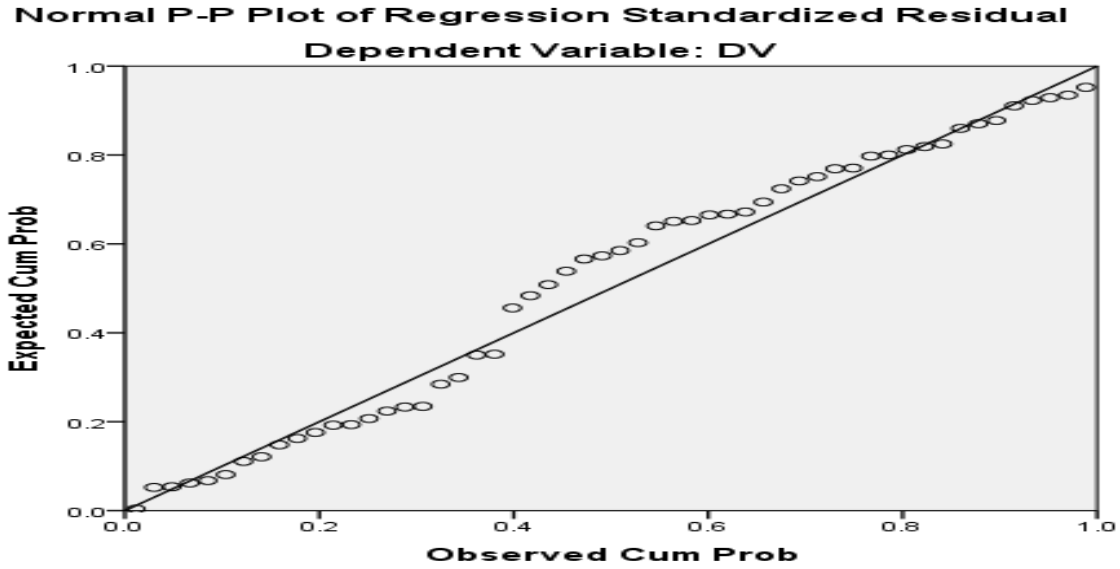

Fig 21 : Normal P – P plot of regression standardized residual between Information Communication Technology usage confidence score and efficiency using ICT in teaching.

Regression Analysis of Frequency of ICT Usage with Teaching Efficiency

Similarly, regression results showed that frequency of ICT usage significantly predicted teaching efficiency. Lecturers who used ICT more often reported greater ease in lesson delivery, student engagement, and assessment management. However, frequency alone was not sufficient to explain efficiency; confidence acted as a mediating factor. This aligns with current scholarship suggesting that frequent use without confidence may result in mechanical application of ICT rather than meaningful integration (Rahman et al., 2023).

Regression Analysis of the Frequency of ICT Usage Teaching with the Efficiency of Using ICT in Teaching.

The last hypothesis is:

H_{14}: Frequency of ICT usage in teaching does not affect the efficiency of using ICT in teaching.

H_{114}: Frequency of ICT usage in teaching affects the efficiency of using ICT in the teaching.

From Table 4.26, R^2= 0.220 (or 22.2%). This shows that the 22.2% of total variance of efficiency using ICT in teaching (Y) is explained by the frequency of ICT usage in teaching (X1).

Table 27 : Model Summary of Frequency of ICT Usage in Teaching and Efficiency of Using ICT in Teaching.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.469[a]	0.220	0.205	0.37773
a. Predictors: (Constant), Efficiency of using ICT in teaching				

In the ANOVA Table 27, p-value associated for this F-statistic is 0.000. Therefore, researchers conclude that the current regression equation meaningfully explains the relationship between the efficiency using ICT in teaching (Y) and the ICT usage confidence score (X1).

Table 28 : ANOVA[a] of Frequency of ICT Usage in Teaching and Efficiency Using ICT in Teaching.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.098	1	2.098	14.703	.000[b]
	Residual	7.420	52	.143		
	Total	9.517	53			
a. Dependent Variable: Efficiency using ICT in teaching						
b. Predictors: (Constant), Frequency of ICT usage in teaching						

From the coefficient Table 28, researcher observes that the estimated regression coefficients are: β0 (Constant) = 2.972 and β1 = 0.358. Researchers reject the null hypothesis (H_{14}: β1 = 0) and researcher conclude that efficiency using ICT in teaching (Y) is significantly affected by the ICT usage confidence score (X1), since p-value = 0.000 < 0.05. Researchers expect that the efficiency using ICT in teaching (Y) will increase by 0.358 units if ICT usage confident level (X1) increased by 1 unit. Based on the estimated regression equation Y=2.972 + 0.358 * X1.

Table 29 : Coefficient of Frequency of ICT Usage in Teaching and Efficiency Using ICT in Teaching.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.972	0.317		9.379	0.000
	frequency of ICT usage in teaching	0.358	0.093	0.469	3.835	0.000
a. Dependent Variable: Efficiency of teaching						

The normal plot Figure 18 of regression standardized residuals for dependent variable indicates a relatively normal distribution.

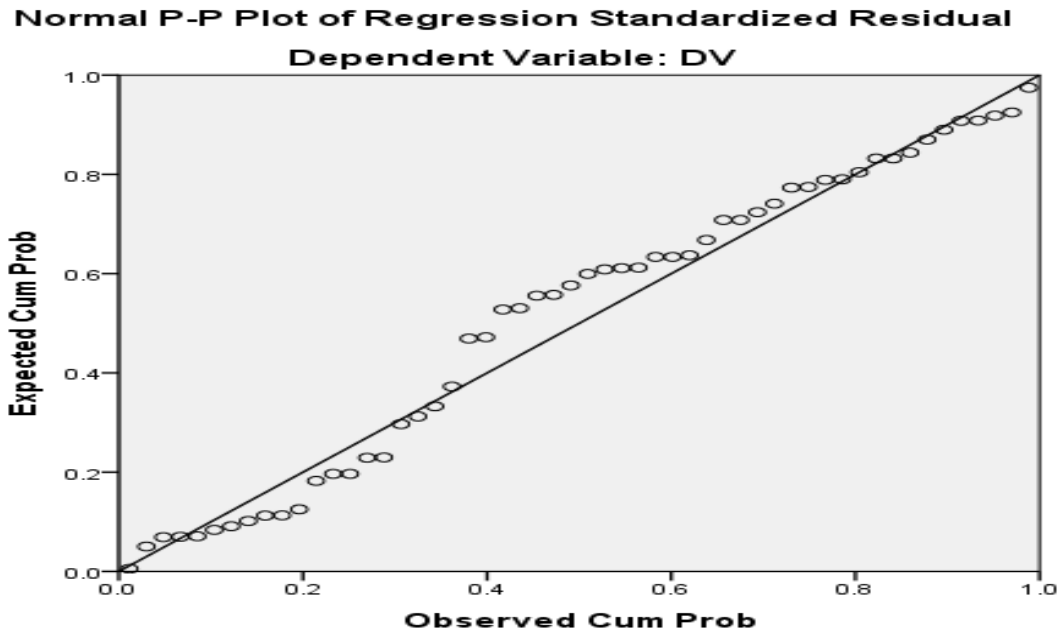

Fig 22 : Normal P – P Plot of Regression Standardized Residual between Frequency of ICT Usage in Teaching and Efficiency using ICT in teaching.

CONCLUSION AND RECOMMENDATIONS

Introduction

This chapter concludes the study by summarizing the main findings, presenting recommendations, and outlining the implications for practice, policy, and future research. The analysis carried out in earlier chapters has shown that lecturers' confidence in ICT, their frequency of ICT use, and the efficiency of ICT in teaching is closely related. The chapter also acknowledges limitations of the research while offering practical suggestions for further investigation.

Conclusion

The findings of this study demonstrate that lecturers at Kolej Profesional MARA Seri Iskandar (KPMSI) exhibit moderate-to-high confidence in ICT usage and integrate ICT frequently in their teaching practices. Confidence was found to be strongest in commonly used applications such as Microsoft Office and online learning platforms, while lower confidence was observed in specialized or advanced digital tools. Importantly, the study confirmed that both ICT confidence and frequency of use significantly predict teaching efficiency. These findings align with recent studies in higher education, which indicate that lecturers with higher digital competence are more capable of engaging students and delivering effective lessons (Lim et al., 2021; González et al., 2021). Overall, the research concludes that ICT is not just a supplementary tool but a critical enabler of effective teaching and learning in higher education. Institutions like KPMSI need to continue investing in targeted training programs to strengthen lecturers' confidence and encourage them to adopt innovative digital practices.

This research is organized into 5 sections which consists of the conclusion, recommendations, implications of the research, limitation of research and suggestions for further research. The discussion will be based on the research questions below:

1. What ICT usage confidence score of KPMSI lecturers?

2. How frequent do KPMSI lecturers use ICT in teaching?

3. How does the usage of ICT in teaching can be affected by ICT usage confidence score and the frequency of ICT usage in teaching?

Based on research questions above, the aims were developed. Below are the research objectives:

1. To determine the confidence score of KPMSI lecturers using ICT.

2. To find the frequency of KPMSI lecturers using ICT in teaching.

3. To identify the relationship between ICT usage confidence score, frequency of ICT usage in teaching and efficiency using ICT in teaching.

RECOMMENDATIONS

Based on the findings, several recommendations are proposed:

1. Targeted Professional Development: ICT workshops should focus not only on basic applications but also on advanced pedagogical tools. Training should be contextualized to lecturers' teaching disciplines to ensure relevance (Rahman et al., 2023).

2. Mentorship and Peer Support: Senior or digitally skilled lecturers should mentor colleagues who are less confident in ICT. Peer support has been shown to enhance technology adoption and reduce resistance (Kimmons, 2020).

3. Encourage Experimentation with ICT: Institutions should create a supportive environment that allows lecturers to experiment with new technologies without fear of failure. This can be achieved by recognizing innovation in teaching practices.

4. Infrastructure and Policy Support: Continuous investment in ICT infrastructure—high-speed internet, updated software, and technical assistance—is crucial. Policy frameworks should emphasize ICT integration as part of institutional performance indicators (OECD, 2021).

Contribution of Research

The following are the findings from the research.

1. Gender, age, length of service, duration use ICT and academic department were not significant with the ICT usage confidence score among lecturers in teaching.
2. Gender, age, length of service and duration use Information Communication Technology were not significant with the frequency of ICT usage in teaching but academic department significant with the frequency of ICT usage in teaching.
3. ICT usage confidence score has significant correlation with efficiency using ICT in teaching. The higher ICT usage confidence score, the more efficient using ICT in teaching.
4. Frequency of ICT usage in teaching has significant correlation with efficiency using ICT in teaching. The higher frequency of ICT usage in teaching, the more efficiently using ICT in teaching.

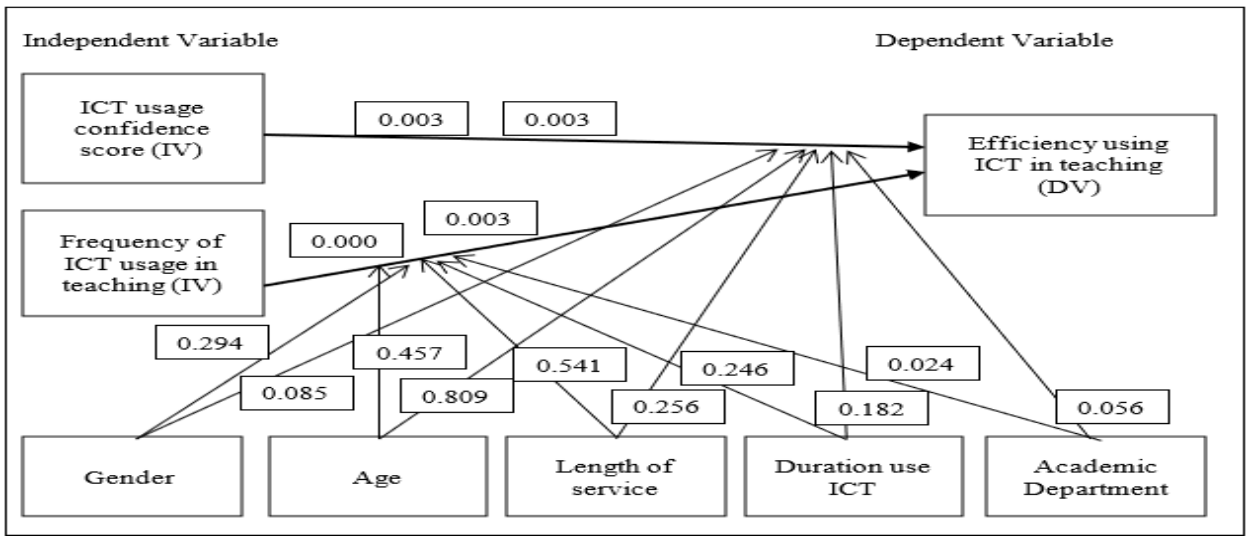

Figure 2: Research model with analysis

Implications of Research

The findings of this study carry implications for multiple stakeholders in higher education:

1. For Lecturers: The results reinforce the importance of digital self-efficacy in teaching. Lecturers with higher ICT confidence and frequency of use were found to be more efficient in delivering lessons. This echoes recent studies indicating that digital self-efficacy positively impacts instructional innovation and classroom engagement (Almazova et al., 2020; Lim et al., 2021).

2. For Institutions (MARA and KPMSI): The outcomes highlight the need for targeted capacity-building programs. While general ICT workshops increase awareness, sustained professional development tailored to subject disciplines is more effective (Rahman et al., 2023). Institutions must also align these initiatives with organizational culture and leadership support, which play a key role in sustaining ICT integration (Cutri & Mena, 2020).

3. For Policymakers: At the national level, the research supports Malaysia's Digital Education Policy 2021–2025, which calls for digital readiness in higher education. Policies should not only focus on infrastructure but also incorporate measures to evaluate lecturers' ICT competence and its impact on students' learning outcomes (OECD, 2021; UNESCO, 2022).

4. For Students: When lecturers integrate ICT confidently, students experience enhanced interactivity and engagement. This improves critical thinking and digital literacy, skills essential for employability in the knowledge economy (Bryson & Andres, 2020; González et al., 2021).

Limitations of Research

Although the study produced valuable insights, several limitations must be considered:

1. Sample Size and Contextual Scope: The research was limited to lecturers at KPMSI. While this provides depth, the sample size restricts the generalizability of findings. Larger multi-institutional studies are recommended to validate results (Queirós et al., 2020).

2. Self-Reported Measures: Confidence and frequency of ICT usage were assessed through self-reports. As highlighted by Podsakoff et al. (2020), self-reported data may be subject to bias such as social desirability or overestimation. Future studies could triangulate data with classroom observations or system usage logs.

3. Quantitative Focus: This study adopted a quantitative survey approach. While this allows for statistical generalization, it limited deeper exploration of lecturers' attitudes and lived experiences. Mixed-method approaches, integrating interviews or focus groups, would yield richer insights (Creswell & Creswell, 2020; Mertens, 2020).

4. Technology-Specific Factors: The study did not analyze how specific ICT tools (e.g., Moodle vs. Google Classroom) differ in shaping confidence and efficiency. Yet, prior research suggests that tool-specific features significantly influence adoption behaviors (Kimmons, 2020).

Suggestions for Further Research

Future research could extend this study in several meaningful directions:

1. Comparative and Multi-Institutional Studies: Expanding the research to multiple MARA colleges or universities would enhance generalizability and allow cross-institutional benchmarking (Rahman et al., 2023; UNESCO, 2022).

2. Longitudinal Research: Since ICT adoption evolves with technological change, longitudinal studies could track lecturers' confidence and frequency over time. This would help identify sustained patterns and long-term effects of professional development (Cutri & Mena, 2020; Saunders et al., 2023).

3. Mixed-Method Approaches: Incorporating qualitative methods, such as interviews and focus groups, could reveal nuanced challenges and motivations behind ICT adoption. Combining survey data with narratives would strengthen validity and depth (Creswell & Creswell, 2020; Mertens, 2020).

4. Impact on Student Learning Outcomes: While this study focused on lecturers, future research should examine how ICT confidence and usage directly influence students' engagement, learning outcomes, and employability. Recent studies highlight that student performance improves significantly when digital pedagogy is effectively applied (González et al., 2021; Lim et al., 2021).

5. Exploring Emerging Technologies: New technologies such as AI-driven adaptive learning platforms, virtual reality (VR), and blockchain-based learning records are reshaping education. Studies could investigate how lecturers adopt and integrate these innovations into their teaching practices (OECD, 2021; UNESCO, 2022).

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