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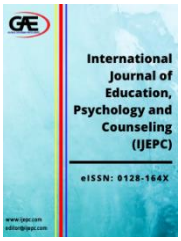

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THE RELATIONSHIP BETWEEN STUDENTS' COMPUTER SYSTEM SKILLS AND THEIR READINESS FOR USING VIRTUALIZATION TECHNOLOGY IN LEARNING AT VOCATIONAL COLLEGE

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Abstract:

This quantitative survey type study aims to examine the relationship between students' computer system skills and students' willingness to use virtualization technology in the learning process at the Vocational College in Tawau, Sabah. A total of 92 students in the vocational certificate and vocational diploma programs were selected as study respondents. Data was collected through the use of questionnaires and analyzed using descriptive statistics and inferential statistics using Statistical Software for Social Sciences (SPSS). The results of descriptive statistical analysis show that both students' computer system skills and their willingness to use virtualization technology are at a high level. Pearson Moment correlation analysis shows that there is a strong and significant relationship between the two variables. These results show that the higher the computer system skills and readiness of students, the more likely they will use virtualization technology in the learning process in vocational colleges. This study provides strong evidence that there is a significant positive relationship between students' computer system skills, their readiness, and the use of virtualization technology in the context of learning in a vocational college. Therefore, it is important for educational institutions to focus on the development of students' computer system skills and strengthen their readiness for the use of virtualization technology to increase the effectiveness of the learning process in this digital era.

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Keywords:

Computer System Skills, Student Readiness, Virtualization Technology, Vocational College

Introduction

The transformation of educational technology has had a major impact on the teaching and learning process at various levels of education in Malaysia. The Malaysian Education Development Plan (PPPM) 2013-2025 sets out 11 steps to transform the country's education system, with an emphasis on the needs of 21st century education. The use of technology in education is one of the important transformations in this plan.

Virtualization technology is now growing in the field of education, especially in learning in classrooms, computer labs, and at home. According to Martín-Gutiérrez et al. (2017), this technology greatly benefits educational institutions by providing access to virtual learning environments such as virtual laboratories, visualization machines, and medical scenarios. This allows students and academic staff to access academic materials more easily, increasing the effectiveness in carrying out coursework (Watfa et al., 2015).

A study by Li (2010) shows that virtualization technologies such as VMware And VirtualBox are effective tools in information technology and computer courses, each with its own advantages and disadvantages. This technology provides a new educational experience that enables easier collaboration between users. Rico (2011) found that high school students who used a virtualization educational platform for programming courses reported a highly satisfying educational experience.

The use of virtualization technology in learning provides students with relevant computer technology skills and knowledge to face the educational challenges of the 21st century. Putri et al. (2019) noted that virtual systems such as Google Classroom facilitate the teaching and learning process, especially in distance learning, because it can be accessed at any time with the Internet. A study by Jou and Liu (2012) found that interactive virtualization environments improve technical skills and student motivation in web-based technical education.

Overall, virtualization technology provides various benefits in education, improving technical skills, facilitating access to learning materials, and providing a more flexible and interactive learning environment. This all supports the transformation of education towards being more competitive and relevant to today's needs.

Background Of The Study

Strengthening skills in the field of technical and vocational education training (TVET) is one of the aims of vocational education towards producing a more skilled workforce. TVET institutions i.e. Vocational Colleges, which are part of vocational training, can develop qualified human resources to meet the growing demands of industry and promote opportunities for individuals in career development (Rajadurai et al. 2018). The implementation of learning based on the use of virtualization technology is very popular nowadays, especially to improve knowledge and skills in the field of information technology as well as the challenge of facing pandemic situations and the increasingly popular current of digital technology. According to

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Mohamed Nazul (2020), the concept of digital learning is to change the Malaysian education system by positioning Malaysia as an inclusive and world-class education that also affects all educational institutions in Malaysia.

In the process of integrating virtualization technology tools into the teaching and learning environment, this study aims to evaluate the impact of the use of technology on the learning process of digital skills. The Digital Education Policy (DPD) which aims to produce a digitally literate generation that is competitive, it is important to enable the ministry to take advantage of the use of digital technology in line with current global needs and trends (KPM, 2021). Students in vocational college education have alternative options in teaching and learning in computer labs or classrooms with the use of this technology, and it also gives them more opportunities to develop their abilities, especially in the field of ICT. According to Wagiran et al. (2017), when developing an educated society, vocational education institutions need to be aware of the speed of information transformation nowadays. This is because students need to be prepared for dynamic changes to gain a deeper understanding of knowledge in line with current industry needs.

Through the Fourth Industrial Revolution (RI 4.0), vocational education institutions must adapt to new emerging technologies through a combination of artificial intelligence, digital data, simulation, Internet of thinks (George & Langenhoven, 2019). The adaptation of technology in vocational education and training must be in line with the needs of future workers who can learn quickly and attitudes in understanding the characteristics of new technologies such as advanced manufacturing technology, intelligent robots, augmented reality, big data analysis, cloud computing, and cyber security that integrated in all fields (Mohammad, Low, & Rahman, 2019).

Transition and transformation of technical and vocational education to Vocational College to be more competitive and competitive. This is shown through the percentage of graduates from vocational colleges who can be marketed, has increased from 2018 to 2020 by 77.6% and 81.6% respectively, (Ministry of Higher Education Malaysia, 2021). Thus, the hybrid teaching and learning system implemented has experienced significant changes due to the increasingly strong shift towards digital technology.

The use of virtualization technology not only supports computer hardware and software but has now expanded to mobile device technology. Implementation in learning and teaching has made many big changes to educational institutions of skills that are very fast changing technology nowadays. According to Klement M, (2016) this virtualization builds a virtual system that maps the virtual guest system to the real host.

Due to the rapidly growing market demand for skilled workforce (TVET), one of the main responsibilities of educational institutions today is to produce a workforce of professionals and future opportunities who consistently develop their understanding of information technology. The implementation of such strategies requires the use of innovative teaching tools, especially computer-based ones.

Nowadays, the concept of skills-based learning has had a positive impact on students, especially those interested in technical and vocational education training (TVET). Computer hardware and software constraints are no longer an obstacle for students to gain knowledge,

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but instead continue to improve their skills in the field of information technology. The technology of cloud computing and virtualization of technical education institutes is useful not only for teachers and students but also for administrators (Upendra Singh & Prashant Kumar Baheti, 2017).

Problem Statement

The development of ICT technology in the 21st century has brought many changes in teaching and learning, but there is still a lack of skills among educators who often use approaches that are now considered stale such as slides and videos. Educational institutions are now using virtualization technology to reduce IT costs, simplify management, and provide easy access to learning resources at any time. Universities use this technology in IT-based courses to address the advantages of modern technology, reducing infrastructure costs by replacing physical resources with virtual resources. Virtualization technology, such as the virtual computer lab introduced by Murphy and McClelland (2009), allows access to high-performance computing resources through the internet.

In Sabah, which has the lowest mobile broadband rates in Malaysia, virtualization technology can help expand access to education and accelerate students' digital technology skills. However, there is a lack of skills and technological equipment among students as well as time constraints in conventional laboratories. According to Upendra Singh & Baheti (2017), virtual labs can overcome this problem by providing unlimited time access. It is important for educational institutions to adopt this technology so that TVET students are not left behind due to lack of hardware and software resources.

The Malaysian Education Development Plan 2013-2025 aims to modernize teaching through investment in technology but faces challenges in ensuring all schools have sufficient devices. Although the implementation of virtualization technology is still new in Malaysia, it has the potential to revolutionize education if done correctly and securely, overcoming issues of reliability, privacy, and security. Lack of computer skills and self-motivation among students can also hinder learning satisfaction.

According to the Sabah State Education Department report (2020), only 47.71% of students in Sabah have access to the internet and devices, showing a large gap in student readiness for virtual learning. Therefore, virtualization technology offers great potential to overcome these challenges and improve access and quality of education in Malaysia.

Study Objectives

The objective of this study is to:

1. Identifying the level of use of virtualization technology for learning among students.
2. Identifying differences in the use of virtualization technology for learning among students based on gender.
3. Identifying differences in the use of virtualization technology for learning among students based on educational level.
4. Identifying the relationship between students' computer system skills and the use of virtualization technology among students.
5. Identifying the relationship of student readiness with the use of virtualization technology among students.

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Research Hypothesis

H_{01}	There is no significant difference between the use of virtualization technology in learning among students based on gender.
H_{02}	There is no significant difference between the use of virtualization technology in learning among students based on the level of education.
H_{03}	There is no significant relationship between the level of students' computer system skills and the use of virtualization technology in learning among students.
H_{04}	There is no significant relationship between the level of student readiness and the use of virtualization technology in learning among students.

Research Design

This study uses a quantitative approach with a survey research design, as explained by Creswell (2013) stated that there are three main approaches in designing research: qualitative, quantitative, and mixed methods. Qualitative research uses words and open-ended questions, while quantitative research uses numbers and closed-ended questions. A survey design is chosen to study a population sample by focusing on trends, attitudes, or opinions of a particular population. The researcher used descriptive statistics to analyze the frequency and percentage based on demographics of the respondents such as gender and education level, as well as to summarize the numerical data obtained. Descriptive statistics are important to collect background information of the participants as stated by Pallant (2016). Inferential statistics are used to discuss the relationship between variables and draw conclusions about the population from the selected sample, as explained by Triola (2018). The approach, design, and method of this study were used to fulfill the purpose and objectives of the study and to answer the research questions that were conducted.

The researcher selected a study population consisting of 121 students at Tawau Vocational College, including students from the Malaysian Vocational Certificate (SVM) program in Computer and Network Systems Technology Certificate and the Malaysian Vocational Diploma (DVM) program in Information Technology Diploma. Based on the table of Krejcie & Morgan (1970), the minimum sample number is 92 students, in accordance with the quantitative approach used. A purposive sampling technique was selected, in which a non-probability sample was used to select subjects with specific characteristics related to the study, as suggested by Muijs (2010) and Etikan et al. (2016). This technique is considered appropriate because this study focuses on students in the field of computing and information technology, selected based on quality and criteria relevant to the purpose of the study.

Research Findings

Analysis of the Level of Use of Student Virtualization Technology in Learning.

The findings of the study show that the total mean score for the level of students' use of virtualization technology is 4.43 and according to the interpretation table from Moidunny, K. (2009) this mean score is at a very high level. However, table 1.0 shows the mean score for each item in the questionnaire for the level of students' use of virtualization technology in learning.

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Table 1.0 displays the mean score for each item in the questionnaire in measuring the level of student use of virtualization technology. This shows that the basis of the use of virtualization technology by students with the highest mean score of 4.59 which is the item "I can improve knowledge through the use of virtualization technology in learning" followed by the mean score of 4.53 which is the item "I often get new skills as a result of the use of virtualization technology in learning". While the item "I always use virtualization technology software in learning" has the lowest mean score, with a mean value of 4.18. However, the lowest mean score is still in the high interpretation category.

Table 1.0: Instrument Mean Score of Students' Use of Virtualization Technology in Learning.

Instrument Items	Minimum	Maximum	Min	Interpretation
I always use virtualization technology software in learning.	3.00	5.00	4.18	High
I enjoy learning the application of virtualization technology in learning.	3.00	5.00	4.48	Very high
I explore ICT skills more broadly through virtualization technology in learning.	3.00	5.00	4.44	Very high
I often get new skills as a result of the use of virtualization technology in learning.	4.00	5.00	4.53	Very high
I am very interested in simulation software in virtualization technology for learning.	2.00	5.00	4.36	High
I got encouragement from teachers to use virtualization technology in learning.	3.00	5.00	4.39	Very high
I can increase my knowledge through the use of virtualization technology in learning.	3.00	5.00	4.59	Very high
I found learning more effective with the use of virtualization technology in learning.	3.00	5.00	4.44	Very high

This study analyzed three main variables: student computer system skills, student readiness, and the use of virtualization technology in learning. Descriptive statistics show that the highest mean value is on students' computer system skills (Mean = 4.45, SP = 0.38), followed by student readiness (Mean = 4.36, SP = 0.42), and the use of virtualization technology (Mean = 4.43, SP = 0.41).

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Table 2.0: Comparison and Correlation Testing Analysis Results.

Hypothesis	Testing	Significant	Decision
H01There is no significant difference between the use of virtualization technology in learning among students based on gender.	t-test	No Value t=0.349 Value p=0.117>0.05	Null Hypothesis Accepted
H02 There is no significant difference between the use of virtualization technology in learning among students based on the level of education.	One-Way Anova Test	Yes p value=0.003<0.05	Null Hypothesis Rejected
H03 There is no significant relationship between the level of students' computer system skills and the use of virtualization technology in learning among students.	Correlation	Yes r=0.628 p=0.001<0.05	Null Hypothesis Rejected
H04 There is no significant relationship between the level of student readiness and the use of virtualization technology in learning among students.	Correlation	Yes r=0.675 p=0.001<0.05	Null Hypothesis Rejected

Table 2.0 shows the t-Test analysis for the comparison of the use of virtualization technology between male and female gender showing a value of t = 0.349 and a significant level of p = 0.117, which is greater than 0.05. Therefore, the null hypothesis failed to be rejected, indicating no significant difference in the use of virtualization technology based on gender. The results of the one-way ANOVA test show that the difference in the use of virtualization technology in learning based on the level of student education is significant with a value of p = 0.003, smaller than 0.05. This means that there is a significant difference in the use of virtualization technology based on the level of education, causing the second null hypothesis to be rejected.

The correlation between students' computer system skills and the use of virtualization technology shows a high positive correlation ($r = 0.628$, $p < 0.05$), indicating a strong relationship between the two variables. Likewise, students' willingness to use virtualization technology shows a very strong positive correlation ($r = 0.675$, $p < 0.05$). These results show that both variables have a significant relationship with the use of virtualization technology in learning.

Discussion

The findings of the study show that there is no significant difference in the use of virtualization technology between male and female students, which is encouraging in the context of gender equality and reflects the success of efforts to promote equality in technology education (Cooper, 2006). This emphasizes the importance of supporting all students regardless of gender to engage with technology. In addition, a one-way ANOVA test found a significant difference

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in the use of virtualization technology based on the level of education of students, indicating the need to adapt the curriculum according to the level of education. Lower level or vocational certificate students need more guidance than more independent vocational diploma students. Educators at all levels need specialized training to effectively integrate virtualization technology, as emphasized by Darling-Hammond, Hyler, and Gardner (2017) regarding the importance of quality professional development.

The findings of the study show a significant relationship between students' computer system skills and students' willingness to use virtualization technology in learning. The high positive correlation between these two variables shows that the higher the skills and readiness of students, the greater their tendency to use virtualization technology, in line with the study of Chamorro-Atalaya (2022) and Latif et al. (2020) which showed high student satisfaction with teaching through virtual tools. This study rejects null hypothesis 3 and 4, proving the importance of skills and readiness in the use of virtualization technology, which can increase the effectiveness of learning and prepare students for the digital era.

Overall, this study shows that students' computer system skills and student readiness have a significant and positive relationship with the use of virtualization technology in learning, proving the importance of both factors in optimizing the use of this technology. Therefore, educational institutions need to focus on the development of computer skills and increase the readiness of students to apply this technology in learning, in line with the global trend of online digital learning and digital learning.

Future Research Direction

Recommendations for future research, the researchers recommend increasing the sample size. To increase the statistical power and reliability of the study, consider increasing the number of student respondents. Larger sample sizes will help reduce limitations associated with small samples and increase confidence in the results. Krejcie and Morgan (1970) proposed an extensive reference table that helps determine the sample size required for a given population size to achieve the desired level of reliability.

Geographical diversity is also important to ensure a more representative perspective, considering conducting studies in multiple locations, including different cities, towns, or countries. This will help identify any regional variations or specific contextual factors that may influence the findings. Some small towns, such as Kota Kinabalu, Sandakan, Lahad Datu, Keningau, Beaufort, Ranau, and others, need to be included in this study to represent the entire state of Sabah. Creswell (2014) discusses the need to include participants from a variety of geographic locations to ensure research findings are applicable to a wider population.

Although this study focuses on skill levels in computer systems, and to expand the scope and consider other ICT talents, such as programming, ICT engineering, cyber security, data analysis, and artificial intelligence. This will provide a more comprehensive understanding of the impact of virtualization technology on various ICT domains.

The researcher also recommends that the use of methods such as qualitative can be used in the future in order to be able to see the results of a more in-depth study coupled with various factors that can be taken into account and considered in future studies.

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Conclusion

National digital education policies are increasingly important in education, where students' skills in computer systems play a critical role in their readiness to use innovative learning tools such as virtualization technology. High computer skills not only reflect a student's ability to navigate a complex digital environment but also an indicator of their willingness to engage with advanced technology. Virtualization technology, which has the potential to change the educational landscape, requires the acceptance and skills of students to be successfully integrated. Students who understand the basics of technology and have high digital literacy demonstrate an interest and ability to adapt to new technologies, including virtualization, which can strengthen their learning experience. The positive correlation between computer skills and willingness to use this technology emphasizes the importance of digital literacy in shaping the future of education, fostering a culture of innovation and exploration in education.

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