

Analysis of Learning Methods Among Students in Adopting Education 4.0 at Higher Learning Institution in Johor

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Abstract: Education 4.0 promotes education in a novel way, primarily through the use of technology-based tools and resources. However, education in Malaysia still lacks of exposure in terms of IoT to students and educators. Therefore, this study aims to determine the level of learning methods among students in adopting education 4.0. It's also aims to determine the level performance in adopting education 4.0 among students and to determine the relationship between learning methods in adopting education 4.0 and performance in adopting education 4.0 among students will be focused on University Tun Hussein Onn Malaysia and University Technology Malaysia. The data obtained will be analyzed descriptively and correlation using Statistical Package for Science (SPSS) and Microsoft Excel. This study used online survey questionnaire to collect the data from 271 valid respondents. The results show that the level of learning methods influences to performance in adopting education 4.0 among students in UTHM and UTM, because when learning methods increase, then the performance in adopting education 4.0 also increase.

Keywords: Education 4.0, Higher Learning Institution, Learning Methods

1. Introduction

Beyond 21st-century capabilities, abilities, and advanced development, such as Artificial Intelligence (AI), extensive information and research, distributed and portable computing systems, online networks, the Internet of Things (IoT), Virtual Reality (VR), and Reality Augmented Computer Entertainment (AR), are transforming the educational process and progressing into new computer-based learning methods, and, more broadly, smart-class products (EFE, 2022). The arrival of the Z generation, which possesses advanced information and digital capabilities, has presented numerous challenges to teachers. The current definition of Gen-Z is a dialect that a more mature generation misunderstands you

have your own type - a type of computer (Kolandan, 2019). They have their own way of understanding and expressing themselves. Advanced locations use the Internet's powerful tools and computer innovation to create imaginative, creative, and expressive digital security elements. These technology prisoners and the Wi-Fi generation also engage in intelligent learning through frames, symbols, sounds, videos, entertainment, transfer, and artificial information (AI) (Bashir & Jan, n.d.). Computer training and blended learning methods are required to improve learning and skills by exchanging classrooms, MOOCs, and discussion forums in order to survive in this adult age. Like all data enhancements, Industry 4.0 has its own model for each category or permutation. On the one hand, so-called smart frames can replicate simple and tired calendars like digital series production. The Industry 4.0 digital physics framework can be viewed as a true or similar type of generation for reproducing social behavior and repeating plans in this case. With an extremely intelligent and creative commitment and a collaborative effort in the fluid system, the digital physical framework can then rebuild adaptability, creativity, and a new absolute H2M connection.

In general, Education 4.0 is a school of thought that encourages intelligent and smart thinking in education. According to Sharma (2019) Education 4.0 promotes education in a novel way, primarily through the use of technology-based tools and resources. This means that traditional classrooms will not teach students how to use textbooks, pens, and essay teachers. Instead, Education 4.0 enables remote students to connect to the Internet and enroll in courses via a variety of open online courses, video chats, or voice calls in order to learn more dynamic information about the same students. You might not learn as much as you think. Education 4.0 was identified as a response to Industry 4.0, with a significant increase in the use of Internet technologies and cross-communication tools. Many other industries are responding to this shift in business practices by developing Healthcare 4.0, Technology 4.0, and other initiatives. The same can be said for the educational ecosystem. Education 4.0 is designed to prepare qualified and qualified professionals for a highly global and digital work environment (Delipiter Lase, 2019)

In the advance technology era, Malaysia is not left behind to be one of the developing countries. According to National Integrity Plan (2017), memorandum that expressed by the former prime minister Dato' Seri Abdullah Haji Ahmad Badawi stated that, Malaysia has been successful as a developing country and it is now on its way on becoming a developed country. However, the Malaysian Institute of Microelectronics Systems (MIMOS) and the Ministry of Science, Technology and Innovation (MOSTI) jointly released the National Internet of Things (IoT) Strategic Roadmap in 2015 as part of Malaysia's preparation for technological progress, specifically IoT (National Integrity Plan, 2017). Although, Malaysia is one of the developing countries but the implementation of IoT in education sector still on the starting point. Top 50 key phrases by relevance, based on 87 publications about "Education 4.0" and "teaching", have been addressed to a lesser extent (digital devices, society, and multimodality) and could be topics to which educational research can contribute (Ramírez-Montoya *et al.*, 2021). This shows that, education in Malaysia still lacks of exposure in terms of IoT to students and educators. The implementation of IoT among Malaysian is still less. In that, the tech savvy people need to investigate more in order to enhance the IoT technology used in educational institution in Malaysia.

Therefore, to achieve the research objectives the level of learning methods among students in adopting education 4.0 are determined. Moreover, the level of performance in adopting education 4.0 among students also determined. Consequently, the relationship between learning methods in adopting education 4.0 and performance in adopting education 4.0 among students is determined.

This research is focused on higher learning institutions in Johor. The respondents of this research are students in the higher learning institution in Johor.

Technological developments are constantly evolving all the time in line with the passage of time. Technological developments also cause changes in the level of technology of a country from developing country to developed country. Malaysia is still at the stage of a developing country, so the use of IoT

technology is very important to be implemented in Malaysia. The use of technology IoT can be nurtured starting at university before student's step into the world of work. Thereby, this study will help Higher Education Malaysia to adapt the use of education 4.0 in universities in Malaysia. After getting the information of the education 4.0 used in University Tun Hussein Onn Malaysia (UTHM) and University Technology Malaysia, this study will focus on challenges faced in order to implement education 4.0 in University Tun Hussein Onn Malaysia (UTHM) and University Technology Malaysia. The forecasted data from University Tun Hussein Onn Malaysia (UTHM) and University Technology Malaysia in this study, will be the great value for universities and government to organize the new plans and strategies in learning methods of education 4.0 in public universities Malaysia.

2. Literature Review

A literature review is an academic piece of writing that demonstrates knowledge and awareness of academic literature on a specific topic. A literature review also includes a critical evaluation of the material The University of Edinburgh (2023). The literature review should include a discussion of the research's theories and concepts. It is a discussion of the research topic and the major challenges associated with it. The goal of this chapter is to talk about how education 4.0 is being implemented in higher learning institution in Malaysia. This chapter is divided into seven sections, the first of which describes the internet of things and education 4.0. Second, the education 4.0 elements involved are listed. Third section is discussed about the implementation of education in Malaysia. Next, describe about the education industry as a whole. After that, will discuss about education industry in Malaysia. Besides that, will be justify about the role of IoT in education. The last discussion is based on the previous study of the application IoT in education industry in the whole world

2.1 Education 4.0

In the new millennium, technology began to permeate the educational process, and both students and teachers began to use technology in fundamental ways (otherwise known as Education 2.0). As technology advanced, especially with the widespread adoption of a more user-generated internet, Education 3.0 emerged. This gave students access to their own information sources, as well as the ability to learn electronically and communicate with teachers and other students (Haleem *et al.*, 2022). Instead of focusing on a back-and-forth between students and teachers, education became more networkable, with students having their own direct link to a variety of different knowledge sources.

Education 4.0 is a learning technique associated with the fourth industrial revolution that focuses on transforming education's future through advanced technology and automation. This industrial revolution includes smart technology, artificial intelligence, and robotics. They all have an impact on our daily lives. If universities are to continue producing successful graduates, they must prepare their students for a world in which cyber-physical systems are ubiquitous across all industries. This includes incorporating technology into the curriculum, completely changing the learning process, and leveraging technology to improve the university experience.

2.2 Learning Methods

Traditional learning method must be improved due to education 4.0, by having more accessible internet network, the way and process in teaching and learning method must be included with technology-based. The emergence of internet of things IoT connectivity in education can strongly impacted lifelong learning programs and alternative credentialing programs (Miranda *et al.*, 2021). There are two important features that need to be considered to be successful in the learning method process which is learning delivery modalities and learning methods to be used. For learning delivery modalities, three modalities frequently used. First is face-to-face learning which based on active learning. Second is online distance learning takes advantage of current technology platforms to carry out remote operations using digitalization, virtualization, and connectivity via synchronous and asynchronous activities which can involve students in flexible-digital models. Third is hybrid learning,

which based on techniques like blended learning or flipped classroom can increase the learning process. Flipped classroom is reverse method from traditional-based teaching which is learning at class and do homework activities at home, transform to learn first by themselves at home and do homework activities at classroom together with the group members by having discussion and debating (LAMBDA Solutions, 2021). Meanwhile, blended learning is combination of traditional-based learning methods with e-learning technologies such as online courses, presentation, games, quizzes. According to LAMBDA Solutions (2021), Blended learning is much more effective for higher education compared to flipped classroom methods. Next, the second features are learning methods to be used which is students who take an active role in their learning and use existing technology to improve the teaching-learning process. For examples gamification-based learning, student can learn while playing games like Kahoot, which can give motivation and incentives to students. Other than that, problem-based learning like case study, can increase the level of critical thinking in solving the problems.

2.3 Elements of Competencies

Nevertheless, significant challenges continue to be faced in this sector, primarily related to providing new methods for specialized training in the current world where complex engineering problems are no longer confined to an individual discipline of science or engineering (Miranda *et al.*, 2021). Hence, incorporating these methods must be considered in new programs and innovative educational projects. In this section, two main features are proposed to be considered as part of these processes (i) the learning delivery modality and (ii) the learning method to be used:

Learning delivery modalities. In this period, how teaching-learning processes are delivered has assumed great relevance since technological advances have allowed educational institutions to deliver teaching-learning programs in different formats. Higher education courses and programs are adopted and combined with different delivery modalities to provide more accessible and flexible programs and provide relevant and personalized content. Therefore, three often used learning-delivery modalities in the period of Education 4.0 can be highlighted: (i) Face-to-Face learning is based mainly on Active Learning. (ii) Online distance learning leverages current technological platforms to carry out remote processes applying digitalization, virtualization and connectivity through synchronous and asynchronous activities that immerse students in flexible-digital models. (iii) Hybrid learning, through techniques like blended learning or flipped classroom, optimizes learning processes and resources.

Learning Methods. These methods also involve principles, strategies, styles, and pedagogical procedures for teaching-learning processes in different modalities. In Education 4.0, new learning methods are emerging to respond to the current need to build a generation of highly competent professionals. Therefore, new programs adapt current student-centered or learner-centered models where students actively participate in the learning processes and apply current and emerging technologies to enhance the teaching learning processes. Consequently, innovative learning methods based on collaborative and cooperative activities emerge along with pedagogical approaches such as challenge-based learning, problem-based learning, learning-by-doing, and gamification-based learning.

2.4 Education 4.0 in Malaysia

Existing industries' values and domains are being transformed by digitalization. Technological advancements fueled by the Fourth Industrial Revolution (IR 4.0) are transforming the way we live, work, and function as a society. Education 4.0, a new educational model developed in response to IR 4.0, is emerging from the digital evolution (Delipiter Lase, 2019).

Within Malaysia, the introduction of Education 4.0 has prompted Malaysia's Ministry of Higher Education (MOHE) to launch initiatives based on 21st-century pedagogies and skills. MOHE has defined the implementation parameters of Education 4.0 as redesigning learning spaces and overhauling pedagogies to include neoteric teaching and learning dimensions such as heutagogy (self-determined learning), pedagogy (peer-oriented learning), and cybergogy (virtual-based learning) (Kolandan, 2019).

The curriculum is being designed to be more fluid and organic, with industry-relevant programmers being offered to prepare students for future industry demands. MOHE's path to Education 4.0 may present both opportunities and challenges. "Can we keep up with the fast-paced changes in technology?" is one of the questions raised. "Can our education system be completely transformed to meet the demands of IR 4.0?" and "Do we have enough experts and financial resources to facilitate and manage new technology?"

These questions are critical in determining the feasibility, or otherwise, of implementing Education 4.0 initiatives in the educational sector. According to (Haleem *et al.*, 2022) the implementation of digital education using modern learning technologies such as augmented reality, virtual reality, and artificial intelligence is indeed costly. We may widen the existing connectivity gap caused by a lack of digital infrastructure, literacy, and funding by hastening the digitization process. According to statistics, more than 4 billion people worldwide still have limited to no access to the Internet as of January 2018.

Will the digital divide derail Education 4.0 initiatives? No, not always. For starters, the advantages of technology in education are undeniable. Technology has inspired a variety of teaching approaches that motivate not only students but also educators in their classrooms (Ghavifekr & Rosdy, 2015). Online game-based learning and assessment, online learning and blended classrooms, mobile and device-based learning, and the use of instructional tools such as Interactive Whiteboards and Student Response Systems are examples of these modern approaches (Industrialising Education 4.0 _ Sunway University, n.d.).

The ubiquitous, almost necessary, use of the Internet in today's society can also support face-to-face teaching and learning approaches, where educators can leverage social media and new media tools like podcasts to make learning more current (Waller *et al.*, 2019).

The proliferation of Web 4.0 has increased the viability of technology as part of classroom instructional strategies (Alakrash & Razak, n.d.). This means that the Web 4.0's 'web of intelligence connections' will see a more interdependent relationship between humans and machines through the use of artificial intelligence, 3D printers, and holograms, among other cutting-edge technologies.

2.5 Higher Learning Institution

The term "institution of higher learning" refers to a college, university, or similar institution, including a technical or business school, that provides postsecondary level academic instruction leading to an associate or higher degree if the school is authorized to grant an associate or higher degree by the appropriate State education authority under State law. When no State law authorizes the awarding of a degree, a school may be recognized as an institution of higher learning if it is accredited for degree programmers by a recognized accrediting agency. This term shall also include a hospital that provides postsecondary educational programs, regardless of whether the hospital awards a postsecondary degree. A non-state educational institution that offers a course leading to a standard college degree or the equivalent and is recognized as such by the secretary of education (or comparable official) of the country or other jurisdiction in which the institution is located shall also be included in this definition.

2.6 Higher Learning Institution in Malaysia

The Ministry of Higher Learning has jurisdiction over the higher learning sector, which is responsible for the operation of higher education institutions (HEIs) in Malaysia (MOHE). The education sector has always received the highest national development budget, demonstrating the Malaysian government's commitment to education (StudyMalaysia, 2022).

In 2011, Malaysia's HEIs (public universities, private higher learning institutions, polytechnics, and community colleges) housed over a million students, 93,000 of whom were international students from

over 100 countries. In 2011, there were approximately 89,686 Malaysian students studying abroad (27,003 receiving sponsorship and 62,683 self-funding (StudyMalaysia, 2022).

Malaysia had 20 public universities, 50 private universities, and six foreign university branch campuses in 2011, as well as 403 active private colleges, 30 polytechnics, and 73 public community colleges. These HEIs provide a diverse range of tertiary qualifications at reasonable prices (StudyMalaysia, 2022).

There are also a number of HEIs from the United Kingdom, the United States, Australia, Canada, France, and New Zealand that offer twinning and '3+0' degree programmes through collaborations with Malaysian private higher learning institutions. At the moment, world-class universities such as RMIT University, Johns Hopkins University School of Medicine, and the Royal College of Surgeons of Ireland have established partnerships with local PHEIs (StudyMalaysia, 2022)

Five of Malaysia's 20 public universities have been designated as research universities, with additional funding for R&D and commercialization of research. The remaining 15 public universities are classified as either comprehensive or focused. The Minister of Higher Education announced in his New Year's speech in 2012 that five public universities would be given autonomy in administration, human resources, financial and academic management, and student intake. University Malaya, University Kebangsaan Malaysia, University Sains Malaysia, University Putra Malaysia, and University Technology Malaysia are the five universities. This initiative aims to promote excellence in local institutions of higher learning (StudyMalaysia, 2022).

The Malaysian Qualifications Agency (MQA), which oversees the implementation of the Malaysian Qualifications Framework, ensures the quality of higher learning. MQA is also in charge of quality assurance, course accreditation, and other related functions at both public and private higher learning institutions (StudyMalaysia, 2022).

2.7 The Importance of Education 4.0 in Higher Learning Institution

Education 4.0 is a deliberate approach to learning that aligns with the fourth industrial revolution and is concerned with transforming the future of education through the use of advanced technology and automation. The World Economic Forum's recent Educational 4.0 Report investigates how technology can improve student access to education and address learning gaps. A summary of the report's findings identifies four priority intervention areas. Foundational numeracy and literacy (FLN), professional development for educators, career readiness, and connecting underserved students are examples of these (Bashir & Jan, 2023). These five building blocks include curriculum, content, capacity, community, and digital interventions. 4.0 education India makes use of both the central and state governments' efforts and interventions. The recommendations can have a significant impact by utilizing more adaptive learning systems and engaging communities, ranging from improving educational accessibility to lowering dropout rates. There is attempted to summarize the major trends of Education 4.0 below (Suvin, 2020).

(a) More personalized instruction

Education 4.0 values each student's uniqueness and the pace at which they learn. A personalized approach to teaching will have a greater impact on students' ability to achieve their goals. There are numerous tools available with Artificial Intelligence and Cloud Computing that tweak the entire teaching process based on the individual learner's needs and learning pace. Faculty, on the other hand, will be able to quickly identify students' strengths and weaknesses and provide immediate feedback.

(b) More opportunities for remote learning

With a set of e-learning tools that promote remote and self-paced learning, Education 4.0's cornerstone is making learning available anywhere, at any time. The concept of Active Blended

Learning (ABL), in which students are actively involved in learning outside of classrooms, is gaining traction. As a result, they master both practical and experiential learning.

(c) The abundance of educational resources

Education 4.0 provides students with a clear path by making tools and techniques available in their learning environment. This means that students will be able to select the tools and techniques they want to use to learn. Some examples include collaborative and engagement tools, flipped learning, and blended learning.

(d) Project-based education

Students learn in a fun and interesting way thanks to Education 4.0's project-driven approach! It avoids theoretical knowledge and encourages students to learn time management skills, organizational skills, collaborative skills, and time management skills, all of which are essential for their future employment.

(e) The abundance of educational resources

With Education 4.0, a more practical method of assessment is introduced. Online and offline assessments are used, and students are graded on projects, assignments, and fieldwork.

(f) At your fingertips, data

Data analytics and reporting in Education 4.0 provide deeper insights into students' learning journeys. The statistical analysis enables teaching staff to determine where students stand and guide them accordingly.

2.8 Previous Study

According to (Abdul Bujang *et al.*, 2020), the purpose of this paper is to look into the demand for digital learning platforms and tools based on the needs of students at Polytechnic Malaysia. According to this research, e-learning platforms that use CIDOS are the most popular learning platforms that students prefer to use in the classroom for learning purposes. The findings are consistent with other studies, which found that CIDOS is well received among students, which our study confirmed (Bt *et al.*, 2016.). However, we discovered previous studies that stated that some lecturers were unable to use CIDOS due to time and difficulty constraints. By addressing these issues, they discovered that CIDOS should be used more extensively and efficiently by lecturers to motivate students to learn. In another way, by efficiently implementing this platform or using different platforms such as Google Classroom, webinars, or Coursera, lecturers can guide students to learn independently in order to move education forward. 4.0.

Second, our research indicates that digital learning via a mobile learning application platform has the potential to attract students for long-term learning. According to Abdul Bujang *et al.* (2020), mobile learning is a useful learning tool for learning. As a result, lecturers can fill the digital practice gap by learning to use mobile applications, allowing them to explore and innovate useful software materials.

Third, there are other digital learning platforms and tools to consider, such as AR and VR apps, YouTube, online gamification, and MOOCs, which may provide excitement in learning. Using an online gamified platform, such as Kahoot and Quizziz, increased student interest, which was beneficial to lecturers who used it in the classroom. However, our research found that there is a lack of interest among students in learning through MOOC platforms. This circumstance, we believe, is related to the challenges and issues discussed in terms of lifestyle, infrastructure, information structure, and professional development (Zulkifli *et al.*, 2020). Thus, by incorporating MOOCs into individual courses of study, it is possible that students will respond positively in the future (Thivviah *et al.*, 2018).

Students in Polytechnic Malaysia continue to prefer digital learning platforms and tools over traditional methods. Nonetheless, there are various digital learning potentials that lecturers can use to interest students; our findings show that engineering students are more likely to choose traditional methods such as chalk and blackboard in class. We consider these barriers because learning in engineering fields is dependent on material support, curriculum, management decisions, and lecturers' readiness to use technologies (Mogoş *et al.*, 2018). Although lecturers face a number of challenges when using digital learning, the importance of technology in education 4.0 is an opportunity for efficient future learning.

2.9 Summary

As a conclusion, this chapter has provided a brief overview about the implementation of education 4.0 in higher learning institutions worldwide and in Malaysia in this chapter. Education 4.0 advancement can be beneficial and plays an important role in enhancing higher learning institutions in order to progress from developing to developed countries. The study explains the implementation of education 4.0 in higher learning institutions worldwide and in Malaysia in this chapter. Education 4.0 advancement can be beneficial and plays an important role in enhancing higher learning institutions in order to progress from developing to developed countries.

3. Research Methodology

Methodology is one of the elements that are important in conducting a research. It gives the appropriate guidance in achieving the research study objectives. This chapter discusses the method and steps that are typically used by researchers during a research study. The research methodology is the most important aspect of the study. The planned methodology will ensure that the data collection methods achieve the research objectives in the correct direction. This chapter will talk about and explain research design, sampling methods, data collection, research instruments, and data analysis.

3.1 Research Design

The researcher should decide on the design of their research before beginning it. Designs are classified into three types: quantitative, qualitative, and mixed method (Abutabenjeh, 2018). The research method chosen will provide guidelines for the techniques and steps of the study. The quantitative research method was used to conduct the analysis in this study because we wanted to know the correlation between the objectives. Quantitative research is the process of generating numerical data and converting it into statistical results. According to Rahi (2017), the approach will focus on data collection from a large population problem and data analysis while ignoring the person's emotions and environment. Survey formats such as questionnaires, online surveys, and mobile surveys will be used to collect data. As a result, the primary focus of this study will be on the questionnaires distributed to respondents in order to collect data and meet the research objectives.

3.2 Research Population and Sample

In this research, the target population will be public universities students from Johor, which is Universiti Tun Hussein Onn Malaysia (UTHM) and University Teknologi Malaysia. (UTM) The population of UTHM students is around 16,700 (UTHM, 2016). The population of UTM students is around 15,200 (UTM 2022). The data is obtained from the official websites of the universities. The size of the sample in this research will be determined by referring to the Krejcie and Morgan table. According to (Krejcie & Morgan, 1970) the sample size of this study is 379 students from UTHM and UTM.

3.3 Data Collection

Data collection is critical to ensuring that the research process runs smoothly and that the study's objectives are met. It is the process of collecting data from reliable sources, testing hypotheses, and

analyzing the results. There are two types of data in this study which is primary data and secondary data.

3.4 Pilot Study

The questionnaire used in this study was created by consulting previous studies and conducting a literature review. As a result, a pilot test will be conducted prior to the distribution of the questionnaires in order to assess the validity and reliability of the questionnaires. It is the final and most important step in data collection because it contributes to the reliability of survey questionnaires. For the pilot test, 30 questionnaires were used.

3.5 Research Instrument

The research instrument is a method used to collect, evaluate and analyze data from subjects related to the research topic. In this research study, a questionnaire is used as the data collection instrument.

(a) Questionnaire

The questionnaire is the instrument that includes a series of questions with the purpose of collect information from respondents. The data collected from the questionnaire were used to determine the level of learning methods among students in adopting education 4.0. and to determine the challenges in adopting education 4.0. The questionnaire is divided into two parts, Part A and Part B. Part A will be the demography of the respondent and part B will deal with education 4.0 in higher level institution to achieve research objective one. Table 1 shows five point Likert scale.

Table 1: Five-point Likert Scale

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

3.6 Data Analysis

In this research, descriptive analysis was used to examine the data obtained from a questionnaire. The technique used to arrange, summarize, and simplify numerical data is known as descriptive analysis. The Statistical Package for Social Sciences (SPSS) and correlation approaches are utilized to analyze the data.

3.7 Summary

In conclusion, the approach might be applied to create a standardised process for acquiring and examining the necessary data. The equipment used to measure data varied depending on the type of study, and there were numerous forms of measurement. This technique covers all aspects of research design, population and survey respondents, survey instruments, data collection, and analysis. This chapter has identified and briefly analysed the main categories of approaches that are available to a researcher within the issue of the subject area. A questionnaire survey was used in the quantitative method. Findings from prior literature reviews will help the study achieve its goal more efficiently. The data analysis will begin after all the required data has been collected and the questionnaires have been returned. The SPSS programme was used to determine the frequency, percentage, mean, and standard deviation of the data that were obtained from the questionnaires.

4. Results and Discussion

4.1 Descriptive Analysis (Independent variable)

This section is to answer the research questions which is to determine the level of learning methods among students in adopting education 4.0. This study, consists of 5 Likert Scale questions of learning methods. The output gain from the data have been analysed into descriptive analysis. There are total six components to measure the level of learning methods among students in adopting education 4.0. The components are face to face learning, online distance learning, hybrid or blended learning, challenge-based learning, problem-based learning and learning by doing.

Table 2: Descriptive Analysis (Learning Methods)

No.	Learning Methods	Mean	Standard Deviation
1	Face-to-face or active learning in adopting education 4.0.	4.33	0.89
2	Online distance learning in adopting education 4.0.	4.33	0.89
3	Hybrid or blended learning in adopting education 4.0.	4.17	0.85
4	Challenge-based learning in adopting education 4.0.	4.21	0.88
5	Problem-based learning in adopting education 4.0.	4.25	0.84
6	Learning by doing in adopting education 4.0.	4.27	0.83
Cumulative Average		4.26	0.67

Table 2 showed the descriptive analysis of the learning methods. There is an outstanding mean value of 4.33 which is scored by item 1 and 2, students agree to have “face-to-face learning and online distance learning in adopting education 4.0”. Next followed by item 6, “Learning by doing in adopting education 4.0” with mean value 4.27. The lowest mean value is students not agree “hybrid or blended learning in adopting education 4.0” which is 4.17. The close to the lowest is item 4, “challenge-based learning in adopting education 4.0” with mean value of 4.21.

4.2 Descriptive Analysis (Dependent variable)

Table 3: Descriptive Analysis (Performance)

No	Performance	Mean	Standard deviation
1	I can usually find ways of applying what I’m learning in class to something else in my life.	4.10	0.88
2	I am learning a lot in most of my classes this semester	4.08	0.92
3	I often discuss with my friends what I’m learning in class	4.17	0.96
4	I usually think about how the topics being discussed in class might be connected to things that i have learned in previous class periods.	4.14	0.91
5	When I am learning about a new idea in a class, I think about how I might apply it in practical ways	4.11	0.91
6	Sometimes I get so interested in something I am studying in class so that I spend extra time	4.20	0.93
7	I regularly participate in class discussions in most of my classes	4.08	0.98
8	Sometimes I am afraid to participate in class	3.91	1.15
9	Often, I find my mind wandering during class	3.94	1.06
10	it's hard to pay attention in many of my classes	3.83	1.15
Cumulative Average		4.06	0.71

Table 3 indicated the descriptive analysis for the performance in adopting education 4.0 in UTHM and UTM. The table showed the 10 items in this group with their mean and standard deviation respectively. The highest mean is scored by item 6, “sometimes I get so interested in something I’m studying in class that I spend extra time trying to learn more about it” with a mean value of 4.20. The almost close to the highest is item 3 which is mean value of 4.17. Meanwhile item 10, “it’s hard to pay attention in many of my classes” had the lowest mean which is 3.83. Besides that, second highest item is 3, “I often discuss with my friends what I’m learning in class” with a mean value of 4.17. The almost close to the lowest item is 8, “Sometimes I am afraid to participate in class” which is mean value is 3.91.

4.3 Correlation and Regression Analysis (Learning Methods)

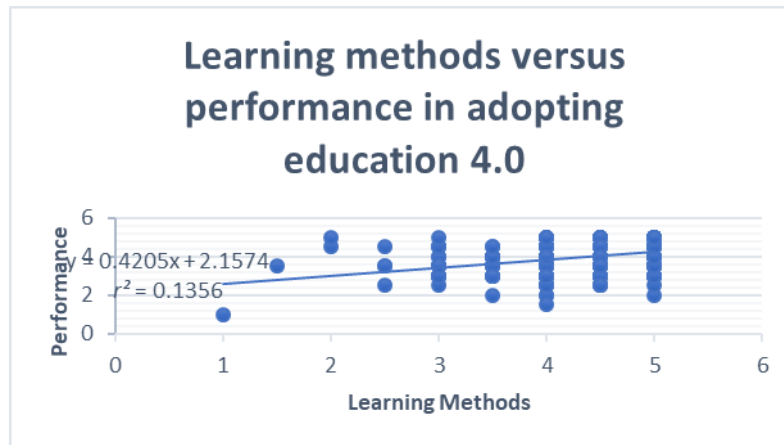


Figure 1: Correlation between learning methods versus performance in adopting education 4.0

Based on Figure 1, it shows the learning methods versus performance in adopting education 4.0 among students from UTHM and UTM. The Pearson’s correlation of coefficient, r is 0.368 ($-0.4 \leq r < 0.4$). There is very little correlation exist between learning methods and performance in adopting education 4.0. The equation of regression line is $y = 0.4205x + 2.1574$. As learning methods increases, the performance in adopting education 4.0 among students increases. In particularly, every time the level of learning methods increases by 1 unit, the level of performance in adopting education 4.0 increases by 0.4205 units. The correlation of determination, r^2 is 0.1356. This shows only 13.56% of the total variation is explained or accounted for by the regression line.

5. Conclusion

In conclusion, the purpose of this research is to determine the level of learning methods among students, determine the level of performance in adopting in education 4.0 among students and to determine the relationship between learning methods in adopting education 4.0 and performance in adopting education 4.0 among students in UHTM and UTM. The developed research questions and objectives have been achieved after all the research process went through.

In this research, the method that have been used to conduct the study is quantitative. The respondents are students from University Tun Hussein Onn Malaysia (UTHM) and Universiti Teknologi Malaysia (UTM), in which the target respondents are 379 but the students that answer the questionnaire is only 271 respondents. Thus, the data are gathered to be used and analyse in this study. According to the findings, the more level of learning methods in adopting education 4.0, the higher of the level of performance in adopting education 4.0 among students in UTHM and UTM. Thus, the learning methods in adopting education 4.0 has influence to the performance of education 4.0 among students in UTHM and UTM. The implementation of learning methods in adopting education 4.0 in higher education sector is crucial, in order to produce graduates who are proficient in the use of

technology. This is because of career opportunities are more to digital age. Thus, the use and creation of new technologies can be developed, then the level of IoT is comparable and can compete with other developed countries.

Last but not least, the results gain has been discussed in the further way. In order to ensure the implementation of learning methods in adopting education 4.0 growing continuously in higher education institutions, the intervention from government and other important parties are crucially needed. Thus, suggestion for future studies have been proposed in order to enhance the reliability and validity of the collected data.

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