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Preferences of educators and students in vocational colleges regarding teaching methods

**The problem and the aim of the study.** This aim of this study is to determine the teaching methods used by Industrial Electronic Equipment Troubleshooting (IEET) course instructors and the preferred teaching methods of IEET students in vocational colleges.

**Research methods.** For data collection and analysis this study used a survey research design and a quantitative method. Stratified random samples of 360 second-year students and 113 instructors on the electronic technology programme from 53 vocational colleges were chosen for the study. Data was collected using a questionnaire with closed-ended questions. Descriptive data analysis was performed and reported in the form of percentages and means.

**Results.** The study findings reveal that the most frequent teaching methods used by the instructor on teaching Industrial Electronic Equipment Troubleshooting courses are lecture (mean 3.88), question and answer (3.69), and presentation (3.68). Conversely, students had a high level of interest in seeking instructors who use teaching methods such as workshop (mean 4.68), simulation (4.50), web-based (4.46), blended learning (4.31), study tour (4.29), and games (40.8).

**Conclusion.** The study found that instructors still frequently use the conventional chalk and talk method in the classroom, i.e., the lecture. Efforts need to be undertaken to ensure that teachers use a variety of teaching methods in the classroom. Teachers should use student-centred teaching approaches and technology to invest students in the learning process. It is proposed that the Ministry of Education, through the Technical and Vocational Education Division, provide training on 21st century pedagogy to vocational college instructors and provide a complete information and communication technology infrastructure to all vocational colleges to improve teaching methods among instructors.

**Keywords:** teaching method, vocational education, Electronic Technology Programme, vocational student, 21st century education

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Introduction

In both developing and developed countries, the development of Technical and Vocational Education and Training (TVET) has become one of the most essential educational development initiatives. In numerous high-income industrialised countries, such as France, Finland, Germany, Australia, South Korea, and Singapore, TVET has also become the preferred educational option [1; 2]. Developed countries like Malaysia, Indonesia, Turkey, Iran, Egypt, Bangladesh, Pakistan, and Nigeria have a greater percentage of skilled workers than developing countries like Malaysia, Indonesia, Turkey, Iran, Egypt, Bangladesh, Pakistan, and Nigeria [2]. For example, in industrialised countries like Germany, skilled workers account for 82 percent of the workforce, while in Singapore, skilled people account for 52 percent [3]. In Malaysia, skilled human resources accounted for only 24.0 percent of the workforce in 2017, or 1,976 employees [4]. Human resources with high levels of skill and knowledge play a critical role in improving an organization’s and a country's competitiveness [5]. As a result, strengthening TVET to create graduates who fulfil industrial needs is high on many countries' agendas [6]. Malaysia's government expects that by 2050, all of its national workers will be classified as skilled workers [7]. Malaysian Vocational Colleges, the country’s largest TVET schools, have been tasked with mainstreaming national TVET and developing skilled people for Malaysia's industrial demands in order to meet that goal. In Malaysia, there are currently 84 vocational colleges offering a variety of vocational programs such as Business Management and Hospitality, Electronic Technology, Automotive Technology, Construction Technology, and Fashion Design. These Malaysian vocational colleges are the most important platform to provide students with the necessary knowledge and skills to become skilled workers in the local economy.

In order for the TVET system to be effective in generating human capital that fulfils job market needs, it must be staffed with qualified educators or instructors who can provide excellent training and development to students using proven methodologies and strategies. Instructors' teaching approaches, according to Lucas [8] and Lucas et al. [9], play a vital role in generating trained and talented students. The adoption of many types of teaching and learning strategies can improve instructors' knowledge and skills in managing teaching and learning activities [8; 9]. Instructors who do not grasp learning challenges are unable to change teaching methods, approaches, and procedures to assist students in developing comprehension and skills, resulting in less effective teaching and learning [10].

Despite this, research conducted by Jusoh and Idris [11] shows that the teacher-centred method, also known as conventional teaching practice, is still extensively used by vocational college instructors. This finding is also supported by studies conducted by Hassan and Ibrahim [12], and Majiari, Aziz, Othman, Ismail, and Mohd Isa, [13]. By far the most common teacher-centred teaching approach used by vocational college instructors is the lecture [12; 13]. The teacher-centre technique is a teaching approach in which a teacher serves as the centre of knowledge, with students receiving information from their teacher in a passive manner. This teaching technique stresses the teacher's direction, lecture, and demonstration techniques [14]. The teacher-centred strategy, on the other hand, was found to promote passive learning, rote memory, and hampered the development of higher-order thinking skills [15; 16]. Furthermore, during traditional teacher-centred learning sessions, students are easily bored and lose their focus [15].
Technology has had a tremendous impact on education in the twenty-first century. Educators have made extensive use of digital technology to make the teaching and learning process easier. TVET programmes are also intended to use 21st-century teaching and learning activities that are supported by adequate digital technologies [17]. The use of technology in the teaching and learning process was found to improve students' self-directed learning skills, allow for self-paced learning, provide interactive learning materials, and promote active learning [18]. Teachers can also use digital technology to implement novel teaching approaches like blended learning and hybrid classrooms [18]. However, studies suggest that the usage of digital tools by vocational college professors to assist students with their learning is still minimal. Despite the government’s efforts to build and promote an e-learning and digital platform for teaching and learning, studies by Damit and Omar [19] indicated that teaching and learning in Malaysian TVET programmes was still underutilising e-learning and digital technology. A study by Abdul Rahman et al. [20] also discovered that vocational instructors use online materials at a low rate. In their classroom sessions, instructors still rely on printed material as a teaching aid [20].

The purpose of this study is to find out how Industrial Electronic Equipment Troubleshooting course instructors teach and how Industrial Electronic Equipment Troubleshooting students desire to learn in vocational colleges. The findings of the study, which were based on replies from students' interests, can be utilised to assist the selection of acceptable teaching methods for the Industrial Electronic Equipment Troubleshooting course (IEET). The IEET is one of the courses of the Malaysian Vocational College's Electronics Technology Programmes. The goal of this course is to provide students with the knowledge and abilities necessary to troubleshoot industrial electronics equipment using manufacturer's manuals and specifications [21]. Students should be able to identify problems, explain functioning, check operational requirements, and report any relevant faults of industrial electronic equipment by the end of the IEET course lesson [22].

Research method

The data was collected and analysed using a survey research methodology and a quantitative method. The information was gathered using a closed-ended questionnaire, and the results were analysed descriptively and provided as percentages and means. The research approach for this study is depicted in Figure 1 below, from instrument development to data analysis.

![Figure 1 Research procedure](image-url)
Research sampling

In Malaysia, there are 84 vocational colleges. Only 52 vocational colleges, on the other hand, offer IEET courses. This study used stratified random sampling to produce a research sample that represented the whole student population. Because of its usefulness for research based on zones, states, divisions, and districts, or if the sample selection was based on distinct categories, the stratum random sampling technique was chosen [23]. The study's population was divided into six zones: northern zone, southern zone, central zone, eastern zone, Sabah zone, and Sarawak zone. The population of the study was 1,118 students, based on the total enrolment of second-year electronic technology students in vocational colleges in 2019 [24]. The proper sample size, according to the sampling table from Krejcie and Morgan [25], is not less than 291 students. This study's overall sample size was established at 360 students, which was more than the number of samples provided by Krejcie and Morgan [25]. The sample size for the investigation is shown in Table 1.

| Zones         | Number of students | Number of students as sample |
|---------------|--------------------|-----------------------------|
| Northern zone | 323                | (323/1105) x 360 = 105      |
| Southern zone | 324                | (324/1105) x 360 = 106      |
| Central zone  | 83                 | (83/1105) x 360 = 27        |
| Eastern zone  | 198                | (198/1105) x 360 = 27       |
| Sabah zone    | 94                 | (94/1105) x 360 = 64        |
| Sarawak zone  | 83                 | (84/1105) x 360 = 106       |
| Total         | 360                |                             |

Research instrument

The research instrument in this study was a closed-ended questionnaire. For this study, a set of questionnaire were used for respondents. Norhapizah [26] conducted a study for a blended learning module, and this instrument was adapted from that research. Through emails, the researcher was able to get permission from the original researcher to adapt her questionnaire for use in this study. Several items have been changed to ensure that the instrument fulfils the study's purpose and scope. The questionnaire was divided into three sections. Part A contains demographic information about respondents; Part B contains the frequency level of teaching methods employed by vocational college instructors based on students' perceptions; and Part C contains the level of students' interest in various teaching methods. Table 2 shows how questionnaire items were created using a five-point Likert scale.

Validity and reliability of the instrument

The purpose of instrument validity and dependability is to ensure that an instrument's accuracy is maintained. The more exact the data acquired to make a decent and quality
study, the higher the instrument's value and level of validity and reliability [27]. This study's instrument validation was carried out by five experts who were chosen for facial, content, and linguistic validation. For item content confirmation, Dimopoulos and Pantis [28] said that at least three experts in the topic covered are required. Five specialists with over 10 years of expertise in their domains were chosen for this study, including educational technology, technical and vocational education, electrical and electronic engineering, and language experts. A pilot study was done to assess the instrument's reliability. A total of 50 students from the Electronic Technology programme who attended the IEET course participated in the pilot project, which was conducted at a vocational college in Malaysia. This questionnaire's total sample meets the guidelines of Johanson and Brooks [29], who indicated that the total sample for the pilot study must be at least 30 study samples. Cronbach's alpha coefficient is used to determine the instrument's reliability. Values of reliability coefficients above 0.6, according to Nunnally and Bernstein [30], are acceptable and can be considered. This questionnaire has a Cronbach alpha value of 0.81. This result shows that the designed questionnaire instrument has a high level of interpretation and is adequate for gathering actual data.

| Questionnaire | Part | Number of Items | Likert Scale |
|---------------|------|-----------------|--------------|
| Students      | A    | 10 items 1 items| Multiple choice Open ended |
|               | B    | 18 items       | Amount of implementation: 1-Never, 2-Almost never, 3-Sometimes, 4-Almost every time, 5-frequently used |
|               | C    | 17 items       | Amount of implementation: 1-Never, 2-Almost never, 3-Sometimes, 4-Almost every time, 5-frequently used |
|               |      | 17 items       | Interest Level: 1-Not at all interested, 2-Not very interested, 3-less interested, 4-Somewhat interested, 5-Very interested |

**Table 2**

The five-point Likert scale used for the questionnaire

Descriptive analysis was used to examine the data. Based on students' perceptions and levels of interest in teaching methods for the IEET course, IBM Statistical Package for the Social Sciences Version 25.0 (SPSS) software was used to determine the frequency level of teaching methods utilised by vocational college instructors. The study's findings are presented as percentages and averages. The mean interpretation utilised for this purpose is as shown in Table 3, which is based on a study by a prior researcher [31].

| Interpretation of Mean Range Values |
|-------------------------------------|
| Mean Score | Level |
| Low 1.00 to 2.33 |
| Moderate 2.34 to 3.67 |
| High 3.68 to 5.00 |

**Table 3**
Based on students' assessments, Table 4 demonstrates the percentage and level of instructional methods used by vocational college instructors. With mean ratings of 3.88, 3.69, and 3.68, respectively, the highest level of teaching methods employed are lecture, question and answer, and presentation methods. When it comes to frequency of use, the lecture technique is used 71.6 percent of the time, the question-and-answer approach is used 57.3 percent of the time, and the presentation method is used 59.2 percent of the time. Storytelling (mean 3.52), workshops (mean 3.51), conversations (mean 3.48), tutorials (mean 3.39), demonstrations (mean 3.21), scientific visits (mean 2.78), and problem solving (mean 2.66) were all employed in a reasonably effective manner. The seven moderately used procedures were employed between 21.4 percent and 64.5 percent of the time. In addition, simulation (mean 2.31), games (mean 2.26), face-to-face and online (blended learning) education (mean 1.98), websites (mean 1.91), seminars (mean 1.48), case studies (mean 1.46) and research (mean 1.46) are also low-use teaching approaches (mean 1.21). The percentage of people who used these strategies on a regular basis ranged from 0.6 percent to 21.9 percent. Overall, it was discovered that the instructors in the field of electronic technology at the Vocational College are still using traditional teaching methods in teaching the IEET course, based on students' perceptions.

**Table 4**

Teaching methods of IEET course instructors based on students' perceptions (n = 360)

| No | Item                | Score (%) | Mean | Level |
|----|---------------------|-----------|------|-------|
|    |                     | 1 | 2 | 3 | 4 | 5 |      |      |
| 1  | Lecture             | 0.3 | 3.6 | 24.4 | 50.8 | 20.8 | 3.88 | High |
| 2  | Question & Answer   | 0.6 | 21.4 | 20.8 | 23.1 | 34.2 | 3.69 | High |
| 3  | Presentation        | 0.8 | 8.6 | 31.4 | 40.6 | 18.6 | 3.68 | High |
| 4  | Storytelling        | 1.9 | 13.9 | 19.7 | 58.9 | 5.6 | 3.52 | Moderate |
| 5  | Workshop            | 5.8 | 16.4 | 21.1 | 34.7 | 21.9 | 3.51 | Moderate |
| 6  | Discussion          | 0.3 | 20.6 | 28.9 | 31.7 | 18.6 | 3.48 | Moderate |
| 7  | Tutorial            | 0.3 | 11.1 | 49.7 | 27.2 | 11.7 | 3.39 | Moderate |
| 8  | Demonstration       | 11.7 | 25.3 | 16.7 | 22.8 | 23.6 | 3.21 | Moderate |
| 9  | Study Tour          | 25.6 | 25.3 | 10.0 | 23.6 | 15.6 | 2.78 | Moderate |
| 10 | Problem Solving     | 16.4 | 25.8 | 36.4 | 18.6 | 2.8 | 2.66 | Moderate |
| 11 | Simulation          | 34.2 | 31.9 | 11.9 | 12.5 | 9.4 | 2.31 | Low |
| 12 | Games               | 18.3 | 44.2 | 31.1 | 6.1 | 0.3 | 2.26 | Low |
| 13 | Blended Learning    | 32.8 | 41.4 | 21.1 | 4.4 | 0.3 | 1.98 | Low |
| 14 | Web-based           | 34.2 | 47.2 | 13.6 | 3.6 | 1.4 | 1.91 | Low |
| 15 | Seminar             | 60.0 | 33.3 | 5.6 | 0.8 | 0.3 | 1.48 | Low |
| 16 | Case Studies        | 62.8 | 28.6 | 8.1 | 0.6 | 0.0 | 1.46 | Low |
| 17 | Research            | 85.3 | 9.4 | 4.7 | 0.6 | 0.0 | 1.21 | Low |

Note. * 1: Never, 2: Rarely (once in 6 weeks), 3: Sometimes (One in 4 weeks), 4: Often (Once in 2 weeks), 5: Always (Every week)
The percentage and mean score on the degree of students' interest in teaching methods for the IEET course are shown in Table 5. With mean scores of 4.68, 4.50, 4.46, 4.31, 4.29, 4.29, 4.08, 3.96, 3.94, and 3.83, respondents show a high level of interest in workshops, simulations, websites (web), blended learning, scientific visits, demonstrations, games, questions and answers, discussions, and presentation teaching approaches by their instructors. Workshop is the most preferred teaching technique among students, with a 99.5 percent approval rating. Furthermore, students are very interested in online learning approaches such as the utilisation of websites and blended learning. Tutorials (mean 3.56), storytelling (mean 3.53), problem solving (mean 3.09), and lectures (mean 2.60) were all mentioned as having a moderate level of interest among respondents. The interest in these strategies ranged from 23.9 percent to 50.3 percent of respondents. Meanwhile, research teaching techniques (mean 1.86), seminars (mean 1.85), and case studies (mean 1.63) drew little attention, with just 83.9 percent, 87.5 percent, and 89.7 percent, respectively, expressing disinterest. The data show that respondents are more interested in technology-based education, with workshop activities continuing to be a required teaching approach for IEET courses.

For the IEET course, Figure 2 shows a graph comparing the level of teaching method utilised by instructors to the teaching method selected by students. The graph shows that for the IEET course, there is a discrepancy between the teaching approach utilised by instructors and the teaching method selected by students.

| No | Item                  | 1 | 2 | 3 | 4 | 5 | Mean | Interest Level |
|----|-----------------------|---|---|---|---|---|------|---------------|
| 1  | Workshop              | 0.0| 0.0| 0.6| 31.4| 68.1| 4.68| High          |
| 2  | Simulation            | 0.0| 0.0| 4.2| 41.7| 54.2| 4.50| High          |
| 3  | Web-based             | 0.0| 0.0| 11.9| 29.7| 58.3| 4.46| High          |
| 4  | Blended Learning      | 0.0| 0.0| 13.6| 41.4| 45.0| 4.31| High          |
| 5  | Study Tour            | 0.0| 3.1| 10.0| 41.7| 45.3| 4.29| High          |
| 6  | Demonstration         | 0.0| 0.0| 0.3| 70.3| 29.4| 4.29| High          |
| 7  | Games                 | 0.0| 3.9| 4.2| 72.2| 19.7| 4.08| High          |
| 8  | Question & Answer     | 0.0| 0.0| 24.2| 55.8| 15.0| 3.96| High          |
| 9  | Discussion            | 1.1| 2.8| 12.5| 68.6| 16.1| 3.94| High          |
| 10 | Presentation          | 0.8| 3.6| 25.6| 51.9| 18.1| 3.83| High          |
| 11 | Tutorial              | 0.0| 3.9| 45.8| 40.3| 10.0| 3.56| Moderate      |
| 12 | Storytelling          | 0.0| 3.9| 43.6| 48.3| 4.2| 3.53| Moderate      |
| 13 | Problem Solving       | 1.9| 15.8| 57.8| 20.3| 4.2| 3.09| Moderate      |
| 14 | Lecture               | 0.3| 63.3| 12.5| 23.9| 0.0| 2.60| Moderate      |
| 15 | Research              | 30.0| 53.9| 16.1| 0.0| 0.0| 1.86| Low           |
| 16 | Seminar               | 36.1| 51.4| 4.2| 8.3| 0.0| 1.85| Low           |
| 17 | Case Studies          | 55.8| 33.9| 6.1| 0.0| 4.2| 1.63| Low           |
According to the findings of the study based on students' perceptions, IEET course instructors employed lecture, question and answer, and presentation as the most common teaching methods. Instructor-led education approaches are extensively used, according to these findings. A teacher-centred method is also known as an instructor-led teaching method. The teacher-centred approach is a traditional teaching method in which the teacher is the focus of information and students receive knowledge from their teacher in a passive manner. As a result, because the teacher has complete control over the session, this teaching technique tends to have order and organisation, is simple to organise, saves time, and is suitable for a big number of students. The teacher-centred method, on the other hand, is found to favour passive learning, rote memory, and hamper the development of higher-level thinking skills [15; 16]. Therefore, efforts need to be undertaken to ensure that teachers use a variety of teaching methods in the classroom.

The utilisation of technology-based learning, such as blended learning, web-based learning, and simulation, is similarly low among vocational college instructors, according to this study. This finding is consistent with the findings of Damit and Omar [19] and Hamzah and Yeop [32], both of which found that vocational instructors' use of digital technology is still minimal. Several factors contribute to instructors' low use of digital technology, including a) instructors' knowledge of current technological developments does not have total relevance [33]; b) some educators still find it difficult to select appropriate teaching methods with the aid of technology [34]; and c) instructors' knowledge of current technological developments is still limited [34] and c) many teachers still lack a thorough understanding of computers, particularly when it comes to the use of applications found in new technologies [34; 35].

The Malaysian Ministry of Education strongly advises using technology in teaching and learning [36]. Educators, they feel, should use modern technology to create a conducive
learning atmosphere in which students' knowledge and abilities can increase. The use of technology in the teaching and learning process was found to improve students' self-directed learning skills, allow for self-paced learning, provide interactive learning materials, and promote active learning [18]. Teachers can also use digital technology to implement novel teaching approaches like blended learning and hybrid classrooms [18]. However, some instructors are still having difficulty using technology-based learning in their classrooms. Instructors who aren't up to date on the latest technical advances are unlikely to encourage students to use technology in the classroom [34; 35].

To overcome the issues of low digital technology use among vocational instructors, the Malaysian Ministry of Education could provide vocational instructors with professional development programs related to digital technology in teaching and learning. A study conducted by An [37] shows that professional development programs significantly change teachers’ attitudes, perceptions, and self-efficacy regarding digital technology integration during teaching and learning. The professional development programs should not only focus on developing teacher technology skills but also on developing instructors’ technological pedagogical content knowledge (TPACK) [38].

Besides that, before implementing technology-assisted teaching, an institution must have a fully functional ICT infrastructure, as this is a requirement for effective use of ICT as a pedagogical instrument [39]. This also is to ensure that teachers and students can easily access ICT infrastructure when needed. Besides computers, tablets, smartphones, and other ICT devices, in the 21st-century learning environment, an institution needs to be provided with a reliable internet connection to make effective use of internet-enabled learning. [40]

In contrast to traditional teaching methods, students choose technology-based learning approaches such as simulations, web-based, and blended learning, according to the study. This demonstrates that students prefer digital technology-based teaching approaches over traditional teaching methods. As a result, instructors must increase their ability to employ digital technology in their teaching and learning processes in order to keep up with the changing digital world.

Overall, the outcomes of this study show that the teaching approach employed by instructors and the teaching method selected by students for the IEET course differ. In TVET programmes, teaching and learning should not be limited to traditional classroom settings. To be productive in the educational process employing digital technology, they should adopt appropriate technical dynamism [41]. Students will be more accepting of the knowledge delivery process through teaching and learning activities if it is supported by relevant new technologies [41; 42]. The adoption of various new technology applications will widen the learning environment outside of the classroom and allow students to dig deeper into the knowledge they are learning. To summarise, electronic technology instructors must quickly develop their skills in the use of technology in order to keep up with current trends in 21st-century education and provide students with engaging learning experiences.

**Conclusion**

In conclusion, there is a discrepancy between the teaching methods utilised by instructors and the teaching methods preferred by students in vocational college. In contrast to the often-used traditional teaching methods by instructors, the survey discovered that students prefer digital technology-based teaching approaches. Efforts should be taken to guarantee
that instructors in the classroom can use a range of teaching methods. To pique students' interest in the learning process, instructors should employ student-centred teaching methods and technology. Besides that, in this 21st century, instructors must increase their ability to employ digital technology in their teaching and learning processes in order to keep up with the changing digital world.

It is proposed that the Ministry of Education, through the Technical and Vocational Education Division, provide professional development programs that can instill skills and knowledge needed by vocational college instructors to respond to the challenge of 21st century education. Emphasis needs to be given to the implementation of 21st century teaching and learning strategies such as game-based learning, problem-based learning, and case study to actively involve students in the lesson process.

In order to promote digital technology utilization in the vocational educational setting, essential support needs to be provided to both students and teachers. For example, classrooms need to be provided with digital learning equipment and a reliable internet connection. Senior teachers and those who are unfamiliar with digital technology, need to be supported with training and mentoring session in using technology-assisted teaching and learning approaches. In addition, recognition awards should be given to the teachers that had been identified to successfully implement innovative teaching strategies.

Finally, as a professional learning organisation, educational institutions need to collaborate with policymakers, vocational colleges, and other stakeholders to develop sustainable professional development plans to improve vocational instructors’ knowledge and skills in implementing 21st century teaching strategies and technology-based teaching and learning.

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