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Trainers' Characteristics Affecting Online Training Effectiveness: A Pre-Experiment among Students in a Malaysian Secondary School

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Abstract: The COVID-19 pandemic has highlighted the implementation of the Fourth Industrial Revolution (4IR), especially in the educational system, in which online learning can also be used as online training among school students. Interestingly, prior studies have highlighted trainers' role as the most important factor affecting online training. However, prior studies that reported the effectiveness of online training among school students and the right trainers' characteristics to sustain its effectiveness have been very limited. Therefore, the objective of this study was to determine online training effectiveness among 150 students in a Malaysian high school using pre-experimental research. Trainers' characteristics perceived by participants were also determined and compared between classroom and online training. Findings indicated that online training was significantly effective regardless of gender and race differences; trainers' characteristics explained 40.5% of variance in online training effectiveness. However, the school students preferred classroom training compared to online training; trainers' characteristics were better in classroom training. Hence, it can be concluded that online training among school students can be effective; however, the characteristics of trainers can be improved to sustain the effectiveness of online training. These results have implications for the sustainability of effective 4IR in the educational system for the post-pandemic era.

Keywords: online learning; online training; trainer characteristic; academic motivation; 4IR; training effectiveness; human development; school student; Malaysia; pre-experimental research; COVID-19



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1. Introduction

The COVID-19 pandemic that emerged in 2019 was mainly spread through respiratory droplets and contact with COVID-19-affected individuals, for which it has also caused millions of deaths and severe illness around the world [1]. Hence, social distancing was identified as one of the most effective steps to prevent the spread of the disease [1]. Consistently, the Fourth Industrial Revolution (4IR) has been shown to be essential to support the social distancing [2]. The 4IR field of study was first coined by Schwab in 2016 [3]; however, the implementation of 4IR was only highlighted in most countries around the world during pandemic COVID-19, especially in the educational system [2,4]. In the context of Malaysia, the 4IR refers to "... the disruptive transformation of industries through the application of emerging technology; it is characterized by new technology that is fusing the physical, digital and biological worlds, impacting all disciplines, industries and the economy" [5] (p. 12). As such, online learning plays an important role as one of the mechanisms that supports the sustainability of the educational system through effective 4IR implementation [4,6].

Malaysia is one of the countries that mandated online learning as part of the 4IR to replace the face-to-face or traditional classroom setting during lockdown in order to prevent the spread of COVID-19 [7]. In fact, the government of Malaysia recently launched the National Fourth Industrial Revolution (4IR) Policy on 1st July 2021 to empower the citizens to “... seize growth opportunities arising from 4IR, create a conducive ecosystem to cope with 4IR, and build trust in an inclusive digital society” [5] (p. 11). The COVID-19 pandemic revolution has dramatically changed Malaysia’s education system, in which both teachers and students have sought to embrace new technology-driven education [8]. Interestingly, online learning has been proven to be effective in delivering formal classroom learning and training programs using different samples in experimental or non-experimental research design, e.g., [9–14]; furthermore, pre-experimental research has usually been conducted in field settings with no control group [15]. For example, previous research has considered samples of undergraduates [9,10], employees [11,12], and the public including parents for children with special needs [13,14]. In fact, the continued use of online learning is still relevant during the COVID-19 pandemic to sustain the educational system through effective 4IR implementation [7,16].

Nonetheless, research related to online training using online learning methods among school students is very limited. For example, a study by Teague and Riley [17], using a sample of Australian school students, showed that online training among school students was not effective. Other studies have shown that online learning is not effective due to various factors including new learning styles, different learning environments, and poor miscommunication between teachers and students, e.g., [18]. In addition, studies have shown that the obstacles faced by learners during COVID-19 have resulted in the rejection of using online learning in the educational system, e.g., [19]. Fortunately, some studies have shown that the teacher’s role is the most important factor affecting online learning effectiveness among school students that can be manipulated to stimulate effective online learning in the educational system, e.g., [20–22]. Similarly, many researchers have demonstrated the important roles of trainers when implementing online learning as online training among employees, e.g., [23–26]. However, the specific characteristics of trainers are still vague, which has led to issues in determining their effect on training effectiveness that can demonstrate why most classroom training is more effective than online training [24]. Additionally, although previous researchers found that trainers’ characteristics were important in online training, research reporting the effect of trainers’ characteristics on online training effectiveness is very limited, e.g., [27].

Hence, there is a need to determine the effectiveness of online training among school students using other samples to support the sustainability of effective 4IR practices in the educational system for the post-pandemic era of COVID-19, especially in Malaysia. Specifically, the objectives of the presented research were to investigate online training effectiveness across different genders and races, the effect of trainers’ characteristics on online training effectiveness, and comparisons of trainers’ characteristics between online and classroom training among high school students in Malaysia using pre-experimental research. The findings of the study will be of significance to the Ministry of Education, educational bodies, educational providers, trainers, and teachers in understanding the factors that lead to effective online training for the Malaysian educational system among school students. Specifically, the results of this study will be useful in providing insights for the design of effective workshops and training programs, especially in the context of secondary school students. Additionally, the findings of the study can contribute to preparing trainers of effective online training programs that in line with an effective 4IR for the post-pandemic era. Therefore, the structure of this paper is arranged as follows. First is a literature review conducted to determine the research objectives and hypotheses, followed by descriptions of the materials and methods used to achieve the research objectives, a discussion of the results, a consideration of research implications, and a conclusion.

2. Literature Review

The COVID-19 pandemic has changed the world's learning norms from face-to-face or classroom learning to online learning [4,15]. The use of online learning has already been researched and recommended because of its benefits for distance learning, cost savings, convenience, time saved (e.g., time for work commuting), flexibility, and ability to include many participants [28–30]. Recommendations to use online learning have also been highlighted as part of 4IR implementation to support the educational system's sustainability [4,7]. Applying 4IR is essential because it can improve productivity, process efficiency and quality, occupational safety, decisions with database information, customer satisfaction, and creativity in product/service development [2,5]. Hence, online learning should be continuously applied after the pandemic is over [4,7]. However, the application of online learning as online training among students must be proven to support learning sustainability in an educational setting, and factors affecting its effectiveness should also be researched for continuous improvement [7,15].

Online learning is a type of learning that uses internet technology to deliver learning, in which the teacher interacts with students through internet communication within a virtual environment [28,29]. Just like classroom learning, theories underlying online learning can include main learning theories, such as cognitivism, behaviorism, and constructivism, through which online learning can provide participants with knowledge, skills, and interest to transfer what they have learned [16,31]. Like classroom learning, the quality of online learning should be learner-centered, i.e., the learning content should be delivered by allowing for interactions between teachers, students, and the community [28,29]; this is illustrated in Figure 1.

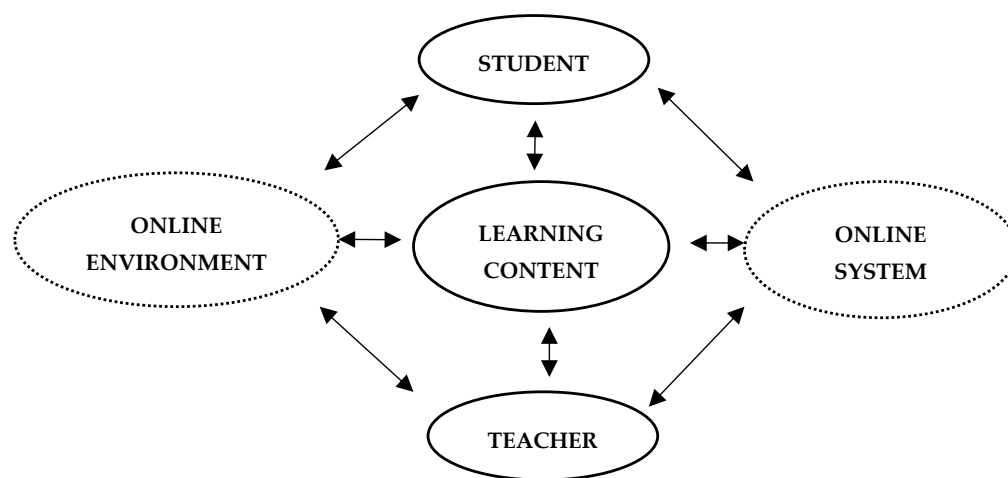


Figure 1. Online learning interaction [28].

Figure 1 demonstrated the online learning interaction explained by Anderson's model [28], in which three main factors affecting the effectiveness of online learning, i.e., teacher, student, and the learning content, are involved. The model also shows that the teacher plays a key role to ensure that students understand the learning content. Interestingly, the role of the teacher in online learning was demonstrated by previous researchers to be the most important factor in creating a learning environment that affects learning performance, e.g., [20,21,23]. This is consistent with findings by several researchers that highlighted the important role of trainers when online learning is applied as online training, e.g., [23–26].

Online learning can also be used as online training through the internet as the learning medium to deliver knowledge and skills, such as by surfing the internet for self-directed training, web-based training, e-learning, online lectures, and learning portals [12,32]. Although learning and training programs have the same objective of delivering skills, knowledge, and attitude (SKA), there are some differences in certain respects between learning and training. In a training program, the context of SKA is specific for learning objectives,

SKA are delivered within a time frame of the training period, acquired SKA are expected to be used after the completion of training, and lessons are focused on relevant SKA to be practiced in actual life situations [31–33]. However, in a learning program, learning involves a long-term process of absorbing SKA with general objectives, SKA are delivered without a specific time frame, the acquired SKA are not expected to be used after the completion of learning, and the acquired SKA might not be practiced in actual life situations [31–33]. Hence, online learning can either be effective or ineffective if used as online training among school students [17].

The majority of previous researchers found that online learning was effective in various samples including school students (e.g., [20,21]), undergraduates (e.g., [9,10,34]), and employees (e.g., [11,12,27]). However, when online learning was implemented as online training among school students, Teague and Riley [17] found that online training was not effective because it failed to achieve its training objective. Their research was conducted among Australian high school students who attended online training with the objective of equipping participants with the ability to perform cardiopulmonary resuscitation in a simulated environment; however, participants did not have the required ability after the completion of online training. Unfortunately, training is considered to be not effective when the training objective is not achieved [35–37]. Hence, there is a need to determine whether online training among school students can effectively achieve its objective by using a different sample of students and training programs in order to sustain effective 4IR in the educational system.

Further, previous scholars have argued that the achievement of training objectives should be evaluated by comparing the pre- and post-evaluation of training to determine training effectiveness, e.g., [38–40]. Some researchers evaluated online training effectiveness using pre- and post-evaluation among undergraduates, e.g., [10], or employees, e.g., [24]. Furthermore, some researchers evaluated online learning effectiveness among school students using pre- and post-evaluation, e.g., [41,42]. Hence, to determine online training effectiveness among school students, it is reasonable to evaluate whether the training objective is achieved using pre- and post-evaluation. Therefore, a research objective and its alternative hypothesis were constructed as follows:

- Research objective 1: To determine online training effectiveness among school students based on the achievement of the training objective (increase in academic motivation).
- Hypothesis Ha1: There will be a significant increase in academic motivation (training objective) as measured in the pre- and post-evaluation of online training among school students at a 0.05 level of significance.

Furthermore, using descriptive analysis, Glerum et al. [24] found that 85% of employee participants mentioned that they were satisfied with classroom training because of the trainers' characteristics compared to only 35% of participants in online training. Additionally, Sitzmann et al. [27] found that trainers' instruction in online training among employees had a significant effect in predicting training effectiveness to equip participants with declarative knowledge ($\beta = 0.34, p = 0.05$) and procedural knowledge ($\beta = 0.53, p = 0.05$); these results demonstrated that trainers' characteristics can have a medium effect on online training effectiveness [43,44]. Hence, the effect of trainers' characteristics on online training effectiveness among school students should also be investigated [24]. Therefore, another research objective and its alternative hypothesis were constructed as follows:

- Research objective 2: To determine the effect of trainers' characteristics on online training effectiveness among school students.
- Hypothesis Ha2: Trainers' characteristics will be shown to have a significant effect on online training effectiveness at a 0.05 level of significance.

In addition, most previous researchers found that participants preferred classroom training to online training even though both types of training were proven effective [24,45]. This is consistent with research findings indicating that school students preferred classroom learning to online learning even though both types of learning were proven effective [41,46]. However,

Sitzmann et al. [27] found that trainers' instruction in online training was more effective than in-classroom training, which was found to have increased declarative knowledge by 13% and procedural knowledge by 20% compared to classroom training. Since previous researchers have demonstrated inconsistent findings, there is a need to compare the trainer characteristics preferred by school students. Therefore, another research objective and its alternative hypothesis were constructed as follows:

- Research objective 3: To compare trainers' characteristics perceived by participants in online and classroom training.
- Hypothesis Ha3: There will be a significant difference in trainers' characteristics perceived by participants in online and classroom training at a 0.05 level of significance.

Additionally, Glerum et al. [24] compared classroom and online training using a sample of teachers from a kindergarten-to-higher educational institution; findings indicated that teachers that deliver the training contents play key roles in effective training. Furthermore, Lim et al. [23] indicated that effective communication between trainers and participants in online training determines training effectiveness, especially in supporting training transfer among employees in established corporate firms located in Korea including Samsung, Hyundai, and LG. Moreover, Julien [47] and Li et al. [26] concluded that trainers should have appropriate competencies and qualifications in delivering online training because they determine a training's effectiveness. Additionally, several trainers' characteristics were identified in an effective classroom training program, including the ability of trainers to maintain a good relationship with participants, recognize participants, and be patient with participants [48]. Hence, the trainers' characteristics that affect online training effectiveness should also be elaborated.

On the other hand, differences in demographic variables could also affect training effectiveness in various training programs and samples; however, some researchers found results suggesting the opposite. For example, some researchers found that gender differences affect training effectiveness; male participants were shown to have a higher level of affective outcomes (self-efficacy) in online courses among samples in Western countries including among American undergraduates [49] and Australian employees [50]. Some researchers found that gender did not affect training effectiveness among in-classroom training samples in Asian countries including Taiwanese adults [51] and Indian employees [52]. Since previous researchers found inconsistent results, gender differences affecting online training effectiveness should be investigated.

Furthermore, some researchers found that race was not a significant demographic variable affecting classroom training effectiveness among employees in working organizations and students in a higher educational institution [53], and consistent findings were shown when using a sample among undergraduates in a Malaysian higher learning institution that attended online learning [34]. However, race differences could affect different types of training programs, such as counselling training among white and Black counselors [54]. Hence, race differences should also be analyzed, especially when using Malaysian samples that consist of various ethnicities including Malay, Chinese, and Indian populations because previous researchers found inconsistent findings.

Therefore, another research objective and its alternative hypothesis were constructed as follows:

- Research objective 4: To compare participants' gender and race differences in training effectiveness, perceived trainers' characteristics for online training, and perceived trainers' characteristics for classroom training.
- Hypothesis Ha4: There will be a significant difference in participants' gender and race groups in training effectiveness, perceived trainers' characteristics for online training, and perceived trainers' characteristics for classroom training at a 0.05 level of significance.

Due to previous scholars' arguments that both classroom and online learning can be effective if it has good learning quality, e.g., [28,29], these research findings will be essential

in improving online training characteristics by providing online trainers with information regarding the key characteristics preferred by participants. In fact, relevant findings can demonstrate the effective use of online learning as online training among school students to sustain effective 4IR implementation in the educational system. These can also be used as a strong justification for the continuous use of online learning as the medium for online training for school students in sustaining effective 4IR implementation in the educational system. Hence, future intervention can be conducted to improve and sustain effective 4IR implementation in the educational system, such as by selecting the best approach of online learning [55], improving learners' performance [56], improving the online learning system [57], and determining instructors' characteristics [58] for effective online training.

3. Materials and Methods

To achieve the research objectives, pre-experimental research was used as the research design. A webinar named "University Life" was organized as a one-day (8 h) online training on 17 December 2020 among Form 5 students at a Malaysian national secondary school. Informed consent was obtained from all participants involved in the study; participants were informed about the online training by their teachers a few weeks before it was organized. Participants were also informed that they were considered to have provided their consent as research subjects once they voluntarily attend the provided online training and answered a few sets of questionnaires. Questionnaires were provided via Google Form; the first page of questionnaires explained participants' consent and involvement in the research. There were 150 participants of the same age (17 years old) who were willing to participate as the research subjects. Participants answered the Google Form questionnaire both before (pre-evaluation) and after (post-evaluation) the completion of online training. In accordance with the Declaration of Helsinki, the research participants acknowledged this research and provided their consent to participate in the pre-experimental research. Participants that agreed to become involved were given a Google form link to provide their consent and to answer the questionnaires in pre-evaluation. Next, participants were given a link to participate in the online training and then given another link to answer the post-evaluation questionnaire. To remain anonymous, participants needed to provide any email address for their questionnaire; this email address was then used to pair the pre- and post-evaluation answers.

The online training program named "University Life" was organized as part of pre-experimental research; it was also specifically designed to achieve the research objectives, handled by a team of undergraduate students, registered with the National University of Malaysia's (Universiti Kebangsaan Malaysia/UKM) formal portal for student activities named "i-star" with registration code C-SKPM2093-2020-137, and developed by undergraduate students with a lecturer's supervision. The online training was also designed and organized in collaboration with teachers from the school a few weeks before a national grand examination for Form 5 students named the Malaysia Education Certificate or SPM (Sijil Pelajaran Malaysia) was scheduled; the SPM is an ultimate examination mandated for Form 5 students throughout Malaysia. Hence, the online training was organized as an additional effort to boost academic motivation among participants before they sat for the SPM. Additionally, the online training was organized in one day, delivered in the Malay language, and combined several expert speakers related to the training objective including a few iconic undergraduate students. These icons were excellent students in academic achievement, sports, co-curriculum involvement, and leaders in students' associations.

The objective of the online training was to boost participants' academic motivation to pursue their study at the university level. Hence, training effectiveness was measured based on the achievement of the training objective to increase participants' academic motivation in pursuing their study at the university level. Prior, the Form 5 students had also attended a one-day different program via traditional classroom training using different contents but the same objective to boost their academic motivation; the traditional classroom training focused on increasing academic motivation through learning strategy.

Hence, the characteristics of trainers perceived by participants in classroom training and online training were also compared. Pre-experimental research was chosen as the research design because participants in the presented research were students that needed academic motivation and attended the online training on the basis of voluntary participation and because pre-experimental research can include pre- and post-test evaluation using the same participants and is appropriate to be used in a field setting that considers ethics [15], such as when it is not appropriate to let any participant that needs academic motivation to not attend.

Training effectiveness was determined based on participants' increase in academic motivation to pursue study at the university level. An instrument named the Individual Training Impact Scale (ITIS) was adapted to measure participants' academic motivation to pursue study at the university level. The ITIS was developed as research output and is registered as copyright at the Intellectual Property Corporation of Malaysia (MyIPO) [59]. The ITIS also has acceptable content validity, convergent validity, and reliability. Fifteen items measuring individual attitude (work motivation) in the first version of ITIS were adapted to measure academic motivation for the presented research; the term "motivation to work for organization" was replaced with the term "motivation to pursue my study at university" depending on its suitability. Table 1 presents the 15 items measuring academic motivation to pursue study at the university level among participants. There were two negative items, and participants' scores for these items were re-coded in reverse for data analysis.

Table 1. Questionnaire items measuring academic motivation.

Num.	English Version	Malay Version
1.	I put forth my best effort to further my study at university.	<i>Saya berusaha bersungguh-sungguh untuk menyambung pengajian di universiti.</i>
2.	I am willing to get up early in the morning or stay up at night to do revisions so that I can study at university.	<i>Saya sanggup untuk bangun awal pagi atau tidur lewat malam untuk mengulangkaji pelajaran bagi membolehkan saya masuk ke universiti.</i>
3.	It has been hard for me to do revisions at home so that I can get to the university. (Reverse score)	<i>Sukar bagi saya untuk mengulangkaji pelajaran bagi membolehkan saya masuk ke universiti. (Skor terbalik)</i>
4.	I probably do not study as hard as others to get to the university. (Reverse score)	<i>Saya mungkin tidak belajar bersungguh-sungguh sebagaimana orang lain yang berusaha untuk ke universiti. (Skor terbalik)</i>
5.	I will study hard to get to the university.	<i>Saya akan belajar bersungguh-sungguh demi untuk memasuki universiti.</i>
6.	Time seems to drag while I am doing my revision.	<i>Saya berasa masa berlalu dengan pantas semasa saya sedang mengulangkaji pelajaran.</i>
7.	I am thrilled to get to the university.	<i>Saya rasa seronok untuk memasuki universiti.</i>
8.	I am willing to sacrifice my time so that I will be accepted to the university.	<i>Saya sanggup mengorbankan masa agar diterima masuk ke universiti.</i>
9.	I will strive to get good marks for every subject.	<i>Saya akan bersungguh-sungguh mendapatkan markah yang baik dalam setiap pelajaran.</i>
10.	I enjoy thinking about getting to the university regardless of the time.	<i>Saya seronok memikirkan untuk masuk ke universiti tanpa mengira masa.</i>
11.	I am willing to study overtime without being asked.	<i>Saya sanggup belajar lebih masa walaupun tanpa disuruh.</i>
12.	I will strive to do the best in any subject taught in school.	<i>Saya akan berusaha melakukan yang terbaik untuk setiap subjek yang diajar di sekolah.</i>
13.	I am willing to give my best effort to get A grade for each subject.	<i>Saya sanggup memberikan sepenuh tenaga untuk mendapat gred A bagi setiap subjek.</i>
14.	I will always try to improve my learning strategy.	<i>Saya akan sentiasa berusaha menambah baik strategi belajar saya.</i>
15.	I will strive to find out about the university that I want to go to.	<i>Saya akan berusaha bersungguh-sungguh untuk mencari maklumat tentang universiti yang ingin saya masuki.</i>

To determine trainers' characteristics perceived by participants in online and classroom training, 10 items in the Learning Environment Inventory (LEI) were adapted into 15 items; the LEI also has acceptable psychometric property, was developed as research output, and is registered as copyright at MyIPO [48]. Table 2 presents the 15 items measuring trainers' characteristics. Participants needed to compare their perception regarding the characteristics of trainers between the presented online training they had just attended and the classroom training that they had attended a few months prior; they had to provide scores for each type of training.

Table 2. Questionnaire items measuring trainers' characteristics perceived by participants.

Num.	English Version	Malay Version
1.	Trainers determined learning objectives.	<i>Jurulatih menetapkan objektif pembelajaran</i>
2.	Trainers used a variety of learning methods.	<i>Jurulatih menggunakan pelbagai kaedah pembelajaran.</i>
3.	Trainers have a good relationship with participants	<i>Jurulatih mempunyai hubungan yang baik dengan peserta.</i>
4.	Trainers created a learning environment that is open and positive.	<i>Jurulatih mencipta suasana pembelajaran yang terbuka dan positif.</i>
5.	Trainers delivered lectures well.	<i>Jurulatih menyampaikan kuliah dengan baik.</i>
6.	Trainers are always patience.	<i>Jurulatih sentiasa bersabar.</i>
7.	Trainers recognized participants.	<i>Jurulatih mengenali peserta.</i>
8.	Trainers give sufficient time for participants to complete task	<i>Jurulatih memberi masa yang mencukupi untuk menyiapkan tugas</i>
9.	Trainers help participants with learning problems individually	<i>Jurulatih membantu peserta. yang menghadapi masalah belajar secara individu.</i>
10.	Trainers generate a cooperative atmosphere in the learning environment.	<i>Jurulatih menghasilkan suasana kerjasama dalam pembelajaran</i>
11.	I am satisfied with the trainers' attention.	<i>Saya berpuas hati dengan layanan jurulatih.</i>
12.	I am satisfied with the interaction in class.	<i>Saya berpuas hati dengan interaksi dalam kelas.</i>
13.	I am satisfied with the trainers' training management.	<i>Saya berpuas hati dengan pengendalian kursus oleh jurulatih.</i>
14.	I am satisfied with activities organized by trainers in the class	<i>Saya berpuas hati dengan aktiviti yang dijalankan jurulatih dalam kelas.</i>
15.	I am satisfied with the instruction given by trainers to participate in the class	<i>Saya berpuas hati dengan arahan yang diberikan jurulatih untuk terlibat dalam kelas.</i>

For all questionnaires, participants needed to give a score from 1 to 10 for their agreement based on given statements for each item in the questionnaire, of which a score of 1 represented "Strongly Disagree" and a score of 10 represented "Strongly Agree". The 10 scores were used because the original instruments (ITIS and LEI) have 10 scores scales and were validated. The Cronbach's alpha value for the presented research was analyzed, and the value for academic motivation to determine the online training effectiveness was 0.966, the value for trainers' characteristics for online training was 0.972, and the value for trainers' characteristics for classroom training was 0.962. Additionally, all original instruments adapted for the presented research (ITIS and LEI) were tested for valid face validity, content validity, and convergent validity (either through EFA or CFA) by their original developer; hence, it was assumed that instruments used for the research also had a sufficient level of validity.

After data collection, SPSS (Statistical Package for Social Sciences) version 26 was used to analyze the data. Before data were used to test the research hypotheses, a few preliminary tests including multivariate analysis assumption and exploratory factor analysis (EFA) were conducted. Further, a paired sample *t*-test was used to determine the online training effectiveness by comparing the mean scores of academic motivation (the training

objective achievement) before and after the completion of the online training in order to test hypothesis Ha1 and achieve research objective 1. In addition, multiple linear regression (MLR) was used to analyze the effect of trainers' characteristics on online training effectiveness in order to test hypothesis Ha2 and achieve research objective 2. However, a Pearson correlation test was carried out before the MLR test was performed. Additionally, the paired sample *t*-test was also used to analyze trainers' characteristics perceived by participants by comparing the mean scores for online and classroom training in order to test hypothesis Ha3 and achieve research objective 3. Moreover, an independent sample *t*-test and a one-way ANOVA were used to analyze a comparison of demographic variables in gender and race groups in order to test hypothesis Ha4 and achieve research objective 4.

4. Results and Discussion

Preliminary analysis indicated that data were normally distributed and did not violate the assumption of multivariate analysis; the EFA indicated three components of trainers' characteristics: trainers' interaction, competency, and attitude. Furthermore, results indicated that the level of academic motivation among respondents increased for the majority of respondents during the post-evaluation compared to the pre-evaluation of online training. In other words, there was a significant difference in the mean score for academic motivation before and after the completion of the online training. This demonstrated that the online training of the school students was able to effectively achieve the training objective. Furthermore, trainers' characteristics showed a significant effect that explained 40.5% of variance in training effectiveness, and trainers' attitude was not shown to be a significant component affecting online training effectiveness when combined with trainers' interactions and competency for online training. Furthermore, there was a significant difference in trainers' characteristics between online and classroom training; this indicated that although online training was effective, classroom training was still preferred by the school students. Results also indicated insignificant differences between gender and race groups, demonstrating that the results were significant among participants' different demographic variables. In addition, trainers' characteristics perceived by participants were determined, and these can be used to improve the quality of online training among school students.

4.1. Preliminary Analysis

Before analyzing the data, preliminary assumptions were tested based on suggestions by Pallant [60]; data were normally distributed based on skewness and kurtosis values, no significant outliers were found based on Cook's distance value, data did not violate the assumption of heteroscedasticity of errors according to a scatter plot, data did not violate the assumption of independence of errors according to the Durbin–Watson test, data did not violate the assumption of multicollinearity according to the tolerance and VIF values, and the linearity of data distribution was checked using a normal P–P plot.

Additionally, an exploratory factor analysis (EFA) was used to determine components for trainers' characteristics using principal components analysis (PCA) with a rotated components matrix. Results showed that there were three components of trainers' characteristics that were renamed interaction, attitude, and competency based on items' suitability. The components were renamed based on findings by Baber [58] that suggested three main components of instructors' characteristics in online learning among undergraduates in South Korean Universities. Tables 3 and 4 show the results of the PCA. It was found that trainers' characteristics are composed of trainers' interaction, attitude, and competency.

Table 3. KMO and Bartlett's test results.

Kaiser–Meyer–Olkin Measure of Sampling Adequacy		0.949
Bartlett's Test of Sphericity	Approx. chi-square	2660.310
	df	105
	Sig.	0.000

Table 4. Rotated components matrix for trainers' characteristics.

Num.	Items	Components		
		Factor 1: Interaction	Factor 2: Attitude	Factor 3: Competency
1	C15 I am satisfied with the instruction given by trainers to participate in the class	0.797		
2	C14 I am satisfied with activities organized by trainers in the class	0.794		
3	C13 I am satisfied with the trainers' training management.	0.778		
4	C12 I am satisfied with the interaction in class.	0.748		
5	C11 I am satisfied with the trainers' attention.	0.715		
6	C8 Trainers give sufficient time for participants to complete task		0.797	
7	C7 Trainers recognized participants.		0.744	
8	C6 Trainers are always patience.		0.730	
9	C9 Trainers help participants with learning problems individually		0.725	
10	C5 Trainers delivered lectures well.		0.700	
11	C10 Trainers generate a cooperation atmosphere in the learning environment.		0.647	
12	C3 Trainers have a good relationship with participants			0.823
13	C4 Trainers created a learning environment that is open and positive.			0.762
14	C2 Trainers used a variety of learning methods.			0.622
15	C1 Trainers determined learning objectives.			0.585

Notes: Extraction method: principal component analysis. Rotation method: varimax with Kaiser normalization. Rotation converged in nine iterations.

4.2. The Effectiveness of Online Training among Participants

To determine online training effectiveness, the achievement of the training objective (to increase academic motivation among participants) was measured. Hence, a paired sample *t*-test was conducted to identify the increase in academic motivation among participants in the pre- and post-evaluation of online training using inferential analysis. Tables 5 and 6 show the results of the paired sample *t*-test. Additionally, Figure 2 shows a comparison of mean scores for academic motivation between the pre- and post-evaluation of online training. Results indicated a significant increase in the mean scores academic motivation as measured in the pre- and post-evaluation, indicating the effectiveness of online training.

Table 5. Paired sample statistics results used to compare the pre- and post-evaluation of academic motivation in determining online training effectiveness.

		Mean	N	Standard Deviation	Standard Error
Pair 1	Post-evaluation	9.0329	150	0.9921	0.0810
	Pre-evaluation	6.2160	150	1.8789	0.1534

Table 6. Paired sample test results used to compare the pre- and post-evaluation of academic motivation in determining online training effectiveness.

		Mean	Standard Deviation	Standard Error	95% Confidence Interval of the Difference		t	df	Sig. (2-Way)
					Lower	Upper			
Pair 1	Post-evaluation Pre-evaluation	2.8169	1.8762	0.1532	2.5142	3.1196	18.388	149	0.000

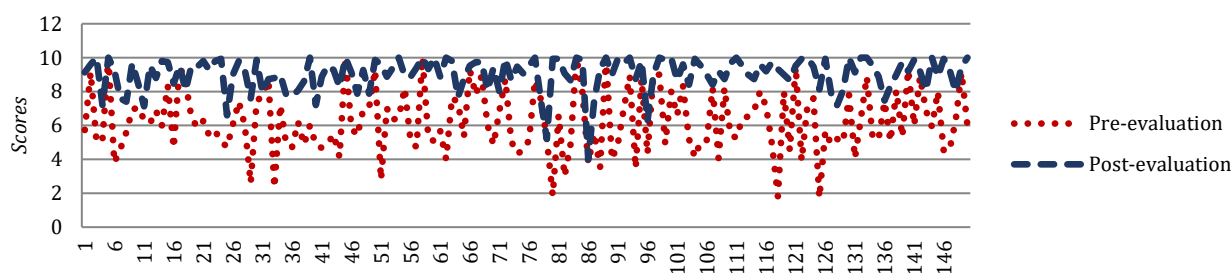


Figure 2. Mean score of participants' academic motivation as measured in pre- and post-evaluation of online training.

The results of the paired sample *t*-test demonstrated a significant improvement as measured in the pre-evaluation ($M = 6.2160$, $SD = 1.8789$) and post-evaluation of online training ($M = 9.0329$, $SD = 0.9921$) with the change of $t(149) = 18.388$, $p < 0.000$ (two-way). The increase in mean scores was 2.8169 with a 95% confidence interval for the difference between 2.5142 and 3.1196. The eta-squared statistic demonstrated a large effect size (0.6941) when calculated using the formula by Cohen [43] (pp. 284–287) and Pallant [60].

Based on the results, it can be concluded that the training objective to increase academic motivation among participants was achieved, thus indicating the effectiveness of online training among school students; hence, hypothesis Ha1 was fully supported. This finding is not consistent with research conducted by Teague and Riley [17] showing that online training among school students in Australia was ineffective. This implies that ineffective online training among school students is not affected by either the learning style (online training) or types of participants (school students) but by the quality of training characteristics. According to Teague and Riley [17], the objective of online training among school students used as subjects in their research was to equip students with behavioral skills to perform cardiopulmonary resuscitation; however, the online training content was very theoretical without demonstrating behavioral constructs. Hence, it can be seen that the online training characteristics should be improved; previous scholars have also explained that both online and classroom learning can be effective if of good quality [28,29].

In addition, to develop effective online training, appropriate learning theories should be applied. For example, if the online training objective is related to behavioral outcomes, behaviorism theory should be used, but if the online training objective is only related to knowledge dissemination, then cognitivism theory can be used [16,31]. In fact, previous researchers found that both online and classroom learning were effective when the two learning styles were compared, e.g., [41,44]. Additionally, many researchers found that online training was effective when tested using various samples including undergraduates, employees, and parents, e.g., [9,14,22]. These results strengthen the argument that the quality of online training can be improved by determining its suitable characteristics, such as by appointing competent trainers [25,26,47]. Hence, online training should be continually organized for post-pandemic to sustain effective 4IR implementation in order to supply additional competencies and values that are not covered in a formal educational setting among school students.

4.3. The Effect of Trainers' Characteristic on Training Effectiveness

To determine the effect of trainers' characteristics on online training effectiveness, the mean scores of trainers' characteristics (interaction, attitude, and competency) in online training were tested in the post-evaluation of academic motivation (training effectiveness) using a multiple linear regression test (MLR); a Pearson correlation test was carried out prior to the MLR test. Table 7 shows the results of Pearson correlation, which indicated that each component of trainers' characteristics had a significant relationship with online training effectiveness, e.g., trainers' interaction ($r = 0.626$, $p = 0.0001$), competency ($r = 0.584$, $p = 0.0001$), and attitude ($r = 0.516$, $p = 0.0001$). Furthermore, Tables 8–10 show the MLR results indicating that trainers' characteristics had a significant effect on online training ef-

fectiveness; hence, hypothesis Ha2 was fully supported. Trainers' characteristics explained 40.5% of variance in training effectiveness ($R^2 = 0.405$, $p = 0.000$), which demonstrated that trainers' characteristics have a moderate effect on training effectiveness [43,44].

Table 7. Correlations between academic motivation and trainers' characteristics.

	Academic Motivation	Interaction	Attitude	Competency
Academic Motivation	1	0.626 **	0.516 **	0.584 **
Interaction	0.626 **	1	0.811 **	0.793 **
Attitude	0.516 **	0.811 **	1	0.816 **
Competency	0.584 **	0.793 **	0.816 **	1

** Significant at 0.0001 level of significance.

Table 8. Model summary for MLR results ^b.

Model	R	R-Squared	Adjusted R-Squared	Std. Error of the Estimate	Durbin–Watson
1	0.645 ^a	0.417	0.405	0.76558	1.548

^a Predictors: (constant), interaction, attitude, and competency. ^b Dependent variable: academic motivation.

Table 9. ANOVA table for MLR results ^a.

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	61.091	3	20.364	34.743	0.000 ^b
	Residual	85.573	146	0.586		
	Total	146.664	149			

^a Dependent variable: academic motivation. ^b Predictors: (constant), interaction, attitude, and competency.

Table 10. Coefficients table for MLR results ^a.

Model		Standardized Coefficients Beta (β)	t	Sig.	95% Confidence Interval for β		Collinearity Statistics	
					Lower	Upper	Tolerance	VIF
1	(Constant)		13.584	0.000	4.454	5.971		
	Interaction	0.495	4.221	0.000	0.181	0.500	0.290	3.444
	Competency	−0.123	−0.994	0.322	−0.221	0.073	0.262	3.816
	Attitude	0.291	2.454	0.015	0.036	0.333	0.284	3.518

^a Dependent variable: academic motivation.

In addition, Table 10 shows that the trainers' interaction ($\beta = 0.495$, $p = 0.000$) and competency ($\beta = 0.291$, $p = 0.015$) had significant effects on training effectiveness; however, trainers' attitude ($\beta = -0.123$, $p = 0.322$) had an insignificant effect on training effectiveness. Hence, further analysis was conducted using partial correlation to determine the influence of trainers' interaction and competency on the significance level of trainers' attitude (see Table 11). Results indicated that trainers' attitude had a significant correlation ($r = 0.516$, $p = 0.0001$) with online training effectiveness (academic motivation); however, this became insignificant when combined with trainers' interaction and competency ($r = -0.082$, $p = 0.322$). When controlling for only trainers' interaction, trainers' attitude became insignificant ($r = 0.018$, $p = 0.829$); when controlling for trainers' competency, trainers' attitude also became insignificant ($r = 0.086$, $p = 0.299$). These results suggest that trainers' attitude will not affect participants' training effectiveness if trainers have sufficient interaction and competency to deliver the online training content.

Table 11. Partial correlation to determine the influence of trainers' interaction and competency on the significance level of correlation between academic motivation and trainers' attitude.

Control Variables	Correlation between Trainers' Attitude and Academic Motivation	
Interaction	Correlation	0.018
	Significance (2-tailed)	0.829
	df	147
Competency	Correlation	0.086
	Significance (2-tailed)	0.299
	df	147
Interaction and Competency	Correlation	−0.082
	Significance (2-tailed)	0.322
	df	146

Note: Cells contain zero-order (Pearson) correlations between trainers' attitude and dependent variable (academic motivation).

Sitzmann et al. [27] only measured online training effectiveness based on participants' learning (declarative and procedural knowledge) to determine the effect of trainers' characteristics; in the presented research, online training effectiveness was measured completely based on the achievement of the training objective; However, the findings of this study were consistent with those of Sitzmann et al. [27], who found trainers' characteristics could affect participants' online training effectiveness with a medium effect size. Furthermore, the authors of the presented research used inferential analysis through the MLR test to determine the effect of trainers' characteristics on training effectiveness. Glerum et al. [24] used descriptive analysis to conclude that trainers' characteristics contributed to 35% of online training effectiveness, as measured by satisfaction. The findings of the presented were also consistent with those of Glerum et al. [24], who showed that trainers' characteristics had a medium effect on training effectiveness, explaining 40.5% of variance in the achievement of training objectives.

4.4. Comparison of Trainers' Characteristics in Online Training and Classroom Training

A paired sample *t*-test was performed to compare the trainers' characteristics as perceived by participants between online and classroom training. Results indicated a significant difference; the scores for trainers' characteristics in classroom training were higher than in online training. These results suggest that the school students preferred trainers' characteristics in classroom training compared to online training, and trainers' characteristics were identified to be better in classroom training than in online training. Hence, online training should be improved for post-pandemic educational purposes in sustaining effective 4IR implementation.

Tables 12 and 13 represent the results of the paired sample *t*-test used to compare trainers' characteristics in online and classroom training. The result of the paired sample *t*-test demonstrated a significant difference of trainers' characteristics as rated by participants for online training ($M = 8.4182$, $SD = 1.4253$) and classroom training ($M = 8.7973$, $SD = 1.1342$), with the difference of $t(149) = 4.099$, $p < 0.000$ (two-way). The difference in mean scores was 0.3791, with a 95% confidence interval for the difference between 0.1964 and 0.5619. The eta-squared statistic demonstrated a moderate effect size (0.1013) when calculated using the formula by Cohen [43] (pp. 284–287) and Pallant [60]. Hence, hypothesis Ha3 was fully supported.

Table 12. Paired sample statistics results used to compare the trainer characteristics in classroom and online training.

		Mean	N	Standard Deviation	Standard Error
Pair 1	Classroom Training	8.7973	150	1.1342	0.0926
	Online Training	8.4182	150	1.4253	0.1164

Table 13. Paired sample test results used to compare the trainer characteristics in classroom and online training.

		Mean	Standard Deviation	Standard Error	95% Confidence Interval of the Difference		t	df	Sig. (2-Way)
					Lower	Upper			
Pair 1	Classroom Training and Online Training	0.37911	1.1326	0.09248	0.1964	0.5619	4.099	149	0.000

The presented research results are consistent with findings by most previous researchers who found that classroom training was better than online training, e.g., [24,45], and that classroom learning was better than online learning, e.g., [41,44]. However, the results were not consistent with the findings of Sitzmann et al. [27], who indicated that participants preferred trainers' characteristics in online training to those in classroom training; Sitzmann et al. [27] also found that online training was more effective than classroom training by up to 20%. The same reason for effective online learning argued by Anderson [28] and Szopiński and Bachnik [29] might explain the inconsistent results, i.e., either online learning or classroom learning can be more effective if it has a better quality than the other. Therefore, it has been demonstrated that whether a training program is delivered through online or classroom settings, training effectiveness is determined by the program's quality, not the types of training, and that the quality of training can be improved by ensuring quality trainers' characteristics.

Furthermore, Figure 3 illustrates the trainers' characteristics in online training as perceived by participants using descriptive analysis. Results indicated that participants rated all trainers' characteristics in online training at high levels, with a minimum mean score of 7.8200 and a maximum mean score of 8.7867. Using a formula by Cohen [43] to recode the 10 scores into three group scores (low, moderate, and high), the trainers' characteristics in online training were considered to be at a high level because the mean scores were above 7.1 [10]. However, the quality of trainers' characteristics in online training could still be improved by maintaining a good relationship with participants ($M = 7.8200$), followed by creating a positive learning environment ($M = 7.9400$), providing sufficient time to task completion ($M = 8.2533$), providing help for learning problems ($M = 8.3067$), using various learning methods ($M = 8.4067$), having patience in teaching ($M = 8.4267$), showing the ability to recognize participants ($M = 8.4600$), generating cooperation in the learning atmosphere ($M = 8.4667$), delivering content well ($M = 8.4933$), determining the training objective ($M = 8.4933$), organizing training activities ($M = 8.5533$), stimulating class interaction ($M = 8.6200$), providing clear instruction ($M = 8.6200$), managing training ($M = 8.6267$), and providing attention to participants ($M = 8.7867$).

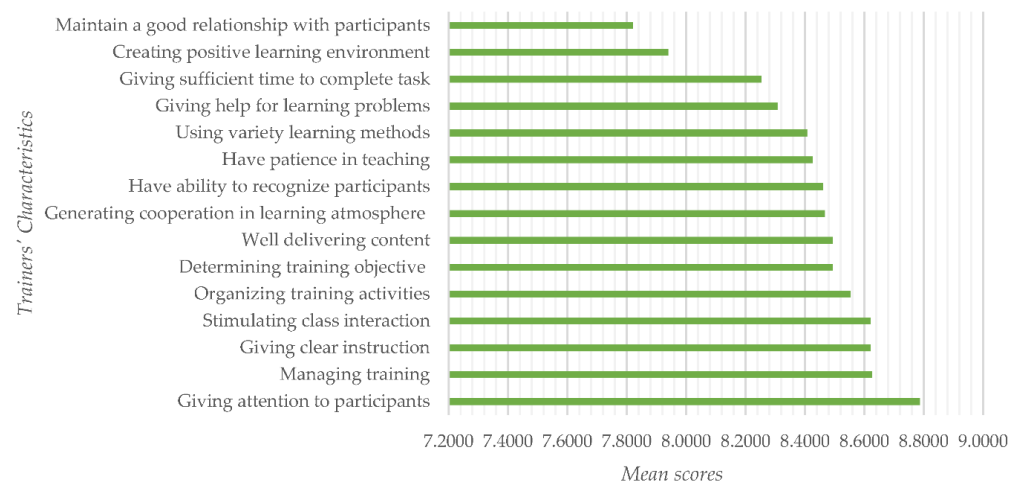


Figure 3. Mean scores of trainers' characteristics rated by participants in online training.

The results can be used to answer a few concerns addressed by previous researchers regarding the roles of trainers since it has been proven that trainers play the main role in effective online training [24], how trainers can communicate effectively with participants since communication between trainers and participants has been proven to determine online training effectiveness [23], and the competencies needed for trainers since trainers' competencies can determine online training effectiveness [26,47], among others. Additionally, the results can also be used to confirm trainers' characteristics for effective online training described by previous researchers, e.g., [24,48].

Figure 4 shows a spider web chart for the mean scores of trainers' characteristics in delivering online and classroom training. Table 14 shows the details of the mean scores given by participants. The gap in trainers' characteristics between online and classroom training as rated by participants can be clearly seen, as the spider web chart for classroom training was larger than that for online training. This demonstrated that classroom training was preferred by participants because it had better-quality trainers' characteristics; these results are similar to those of most previous researchers, e.g., [24,45]. Perhaps online training is still new compared to classroom training; hence, the trainers' characteristics should be improved.

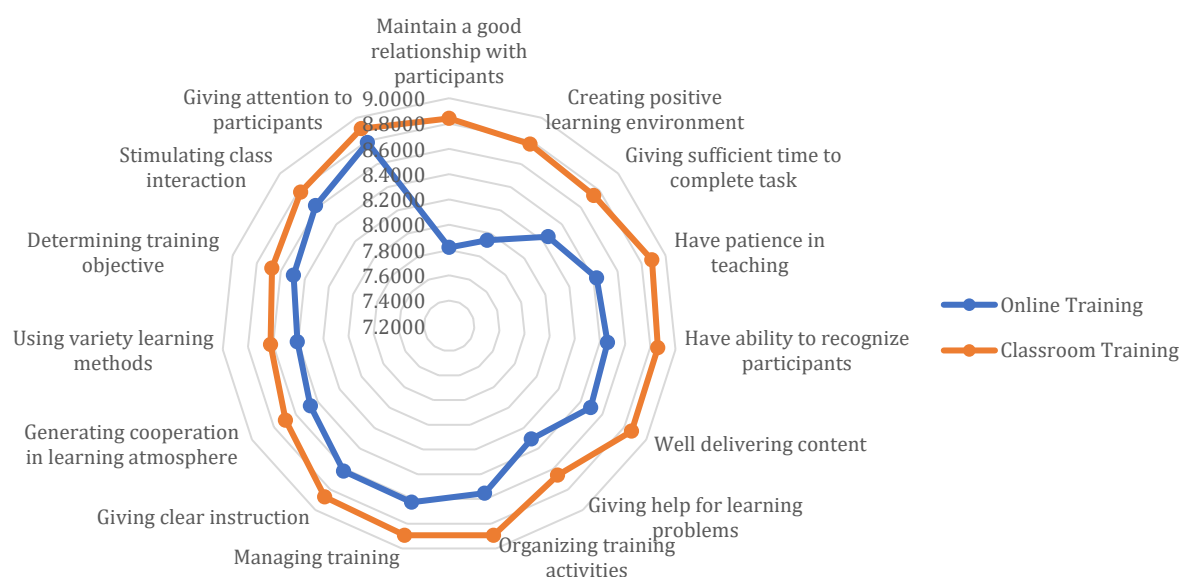


Figure 4. Spider web chart for the mean scores of training characteristics related to trainers' roles in online and classroom training.

Table 14. Trainers' characteristics perceived by participants.

Questionnaire Items	Trainers' Characteristics	Mean Scores		Standard Deviation (SD)	Improvement Priority
		Online Training	Classroom Training		
3	Maintaining a good relationship with participants	7.8200	8.8400	1.0200	1
4	Creating a positive learning environment	7.9400	8.7733	0.8333	2
8	Providing sufficient time to complete the task	8.2533	8.7400	0.4867	3
6	Having patience in teaching	8.4267	8.8867	0.4600	4
7	Having the ability to recognize participants	8.4600	8.8600	0.4000	5
5	Delivering content well	8.4933	8.8667	0.3734	6
9	Providing help for learning problems	8.3067	8.6600	0.3533	7
14	Organizing training activities	8.5533	8.8933	0.3400	8
13	Managing training	8.6267	8.8933	0.2666	9
15	Providing clear instruction	8.6200	8.8733	0.2533	10
10	Generating cooperation in learning atmosphere	8.4667	8.6933	0.2266	11
2	Using a variety of learning methods	8.4067	8.6200	0.2133	12
1	Determining training objective	8.4933	8.6733	0.1800	13
12	Stimulating class interaction	8.6200	8.7800	0.1600	14
11	Providing attention to participants	8.7867	8.9067	0.1200	15

Results also indicated that participants preferred classroom training to online training because the trainers had the better characteristics of a creating a good relationship with participants (SD = 1.0200), followed by creating a positive learning environment (SD = 0.8333), providing sufficient time to complete tasks (SD = 0.4867), having patience in teaching (SD = 0.4600), recognizing participants (SD = 0.4000), delivering content well (SD = 0.3734), providing help for learning problems (SD = 0.3533), organizing training activities (SD = 0.3400), managing training (SD = 0.2666), providing clear instruction (SD = 0.2533), creating a cooperative learning atmosphere (SD = 0.2266), using various learning methods (SD = 0.2133), determining the training objective (SD = 0.1800), stimulating class interaction (SD = 0.1600), and providing attention to participants (SD = 0.1200).

4.5. Comparison of Demographic Background in Gender and Race Groups

Participants involved in the research were Form 5 students aged 17 years (100%). The majority of them were female (79.3%), and only 20.7% were male; see Table 15. Respondents were also of different races, with the majority of them being Malay (71.3%), followed by Chinese (14%), Indian (8%), and other races (6.7%); this is normal for national schools in Malaysia that use the Malay language as the formal language to deliver learning. However, previous research has shown that demographic differences might affect training effectiveness. Therefore, comparison tests were conducted.

Table 15. Respondents' background.

Demographic		Frequency	Percentage (%)
Gender	Male	31	20.7
	Female	119	79.3
	Total	150	100
Race	Malay	107	71.3
	Chinese	21	14
	Indian	12	8
	Others	10	6.7
	Total	150	100

Table 16 shows the results of an independent sample *t*-test used to determine the differences in participants' gender in the post-evaluation of academic motivation and their perception on trainers' characteristics in online and classroom training. Results indicated insignificant mean differences for females and males, with a difference of $t(148) = -1.542$, $p = 0.125$ (two-way) for academic motivation; $t(148) = -1.419$, $p = 0.163$ (two-way) for trainers' characteristics in online training; and $t(148) = 0.475$, $p = 0.635$ (two-way) for trainers' characteristics in classroom training. Results were similar to those of researchers that used Asian samples including Liao and Tai [51] and Mishra et al. [52] but not similar to those of researchers that used western samples including Simmering et al. [49] and Saira et al. [50]. The authors of the presented research also used samples from Asian countries, such as Malaysia, that have similar gender characteristics that did not affect training effectiveness and the perception of trainers' characteristics in either online or classroom training.

Table 16. Independent sample *t*-test results used to compare the effect of gender differences.

		Levene's Test for Equality of Variances		<i>t</i> -Test for Equality of Means						
		F	Sig.	t	df	Sig. (2-Tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Academic motivation	Equal variances assumed	1.067	0.303	−1.542	148	0.125	−0.30711	0.19914	−0.70064	0.08642
	Equal variances not assumed			−1.419	42.516	0.163	−0.30711	0.21644	−0.74375	0.12952
Trainers' characteristic in online training	Equal variances assumed	0.369	0.545	0.475	148	0.635	0.13697	0.28816	−0.43247	0.70640
	Equal variances not assumed			0.471	46.259	0.640	0.13697	0.29109	−0.44888	0.72281
Trainers' characteristic in classroom training	Equal variances assumed	0.188	0.665	0.594	148	0.553	0.13619	0.22920	−0.31673	0.58911
	Equal variances not assumed			0.571	44.593	0.571	0.13619	0.23865	−0.34460	0.61698

Furthermore, Tables 17 and 18 show the results of a one-way ANOVA used to determine the differences in participants' race for the post-evaluation of academic motivation and their perception on trainers' characteristics in online and classroom training. Results indicated insignificant mean differences between race groups, with a difference of $F(149) = 1.011$, $p = 0.468$ (two-way) for academic motivation; $F(149) = 1.291$, $p = 0.137$ (two-way) for trainers' characteristics in online training; and $F(149) = 1.181$, $p = 0.242$ (two-way) for trainers' characteristics in classroom training. Hence, hypothesis Ha4 was not supported.

Table 17. One-way ANOVA results used to compare the effect of race differences.

		Sum of Squares	df	Mean Square	F	Sig.
Academic Motivation	Between Groups	34.525	42	0.822	1.011	0.468
	Within Groups	86.975	107	0.813		
	Total	121.500	149			
Trainers' characteristic in online training	Between Groups	53.147	56	0.949	1.291	0.137
	Within Groups	68.353	93	0.735		
	Total	121.500	149			
Trainers' characteristic in classroom training	Between Groups	41.952	46	0.912	1.181	0.242
	Within Groups	79.548	103	0.772		
	Total	121.500	149			

Table 18. Test of homogeneity of variances for one-way ANOVA.

		Levene's Statistic	df1	df2	Sig.
Academic Motivation	Based on mean	1.552	3	146	0.204
	Based on median	1.063	3	146	0.367
	Based on median and with adjusted df	1.063	3	137.951	0.367
	Based on trimmed mean	1.435	3	146	0.235
Trainers' characteristic in online training	Based on mean	1.820	3	146	0.146
	Based on median	1.015	3	146	0.388
	Based on median and with adjusted df	1.015	3	134.826	0.388
	Based on trimmed mean	1.589	3	146	0.195
Trainers' characteristic in classroom training	Based on mean	0.517	3	146	0.671
	Based on median	0.401	3	146	0.752
	Based on median and with adjusted df	0.401	3	144.309	0.752
	Based on trimmed mean	0.494	3	146	0.687

Results were consistent with those of previous researchers that used various samples including Ragins et al. [57], who used a sample of employees in an organization, and Islam et al. [34], who used a sample of undergraduates in a Malaysian university. However, the results were not consistent with those of McRae et al. [58], who found that Black and white races in a western country affected training effectiveness in counselor training. Perhaps the effects of the educational backgrounds of the Black and white races in the studied western country on the counseling field of study was not the same, with different effects on the training effectiveness among both race groups; this is because a participant's ability is considered to be an individual characteristic that can affect training effectiveness [8]. However, although Malaysians are of various races including Malay, Chinese, and Indian, their educational background is generally the same, especially in the presented research that used samples of students from the same school. Hence, individuals' ability to affect online training effectiveness should be considered in future studies.

5. Research Implications

There are several research implications of the presented findings. Firstly, the findings indicate that online training among the student school students was effective. This implies that online training among school students should be organized continuously as part of the effective 4IR to sustain the educational system in Malaysia after the COVID-19 pandemic. Online training it is beneficial for distance learning because it saves cost, is more convenient, saves time (e.g., for work commuting), is flexible, and can include a large number of participants [28–30]. Hence, the Ministry of Education, education bodies, educational providers, trainers, and teachers should organize online training among school students to supply additional competencies and values that are not covered in the formal educational setting to sustain effective 4IR implementation in the educational system.

Secondly, from a theoretical perspective, the presented research findings are consistent with learning theories that underlie the online learning concept. According to Anderson [28] and Szopiński and Bachnik [29], both online and classroom learning can be effective if they have good-quality learning characteristics, such as demonstrating the criteria of trainers, and relevant training content. In addition, participants' individual characteristics should also be considered when selecting appropriate learning theory to develop online training programs because the application of appropriate learning theories can lead to the achievement of training objectives [16,31]. For example, if the objective of online training is to deliver behavioral outcomes, behaviorism learning theory should be used, such as by showing videos demonstrating intended behavior in online training [13]; this will match the right approach used by the trainer to deliver effective online training content to participants. Doukanari et al. [55] suggested applying teamwork training and pedagogical mentors that involve teamwork and collaboration among participants in online learning to solve case-based learning and problem based-learning; this can also be used to sustain effective online training.

Thirdly, from a practical perspective, it has been proven that trainers' characteristics are important in the development effective online training programs because they explain why participants prefer traditional classroom training to online training [24]. Hence, the government and stakeholders that provide online training should take progressive action to support trainers in online training, e.g., by developing an online training system that can allow trainers to optimize their teaching effectiveness when delivering training content [61]. Online training should also have a gamification feature to facilitate trainers because previous studies have shown that such a feature can stimulate interesting learning methods that can engage participants in online training [37,62,63]. Furthermore, Efthymiou and Zarifis [57] suggested eight components of an advanced online learning system (online communities, workplace simulation, discussion forum, learning by doing, continuous feedback, custom-made resources, analytics of participants' well-being and involvement, and physical presence) that uses a blended learning approach; this approach can also be considered to develop an effective online training system.

In addition, the presented findings indicated that the most important trainers' characteristics were trainers' interaction, followed by trainers' competency and attitude, but trainers' attitude will no longer be significant if trainers' have sufficient competency and interaction. Hence, it is essential to organize a train-for-trainer program among trainers with the right skills in delivering effective online training [64], as well as to provide trainers with coaching and mentoring programs [65]. Furthermore, Julien [47], Li et al. [26], and Liu et al. [25] suggested hiring a competent trainer that could ensure the effectiveness of online training delivery. In addition, an online training system should also facilitate collaboration among trainers and stimulate partnership among different institutions to improve the learning content [66]. Hence, the feature of the online training system in the 4IR should support and facilitate trainers with these training characteristics. Since online training is still new compared to classroom training, training quality should be improved to sustain 4IR implementation among school students [4,7].

Fourthly, the findings of this study highlighted a few effective trainer characteristics in online training as perceived by school students. These include competency in maintaining a good relationship with participants, creating a positive learning environment, providing sufficient time to complete tasks, having patience in teaching, recognizing participants, delivering content well, providing help for learning problems, organizing training activities, managing training, providing clear instruction, creating a cooperative learning atmosphere, using various learning methods, determining the training objective, stimulating class interaction, and providing attention to participants. Hence, it is suggested that trainers should be equipped with these characteristics through train-for-trainer programs for online training. Trainers should also be mandated to have the ability to interact with participants and competency to deliver online training.

Fifthly, for sustainable business purposes, companies related to educational business must be agile and responsive if they want to stay competitive, especially online training providers. They should be able to adapt to a rapidly changing and ever-changing digital environment, especially during the 4IR era [67]. These companies need to make sure that they are ready to develop a well-trained workforce to stay competitive through training and development programs [68]. Training and development not only increase employees' productivity but also help companies to better understand their customers, competition, and changing markets [32,33]. Many companies have also found that effective training and development programs help improve customer service, product development, website design and management, marketing strategies, and more [32,68]. The findings of the presented research reiterate the idea that companies can achieve these goals by investing in training and development programs to enhance trainers' characteristics for online training; this will benefit not only their own employees but also their business in offering online training for school students.

Nonetheless, there were some limitations to the presented research. First, the study was conducted using a pre-experimental approach, in which some criteria that might affect training effectiveness, including the content of the training program in both online and classroom training, were not controlled. According to Anderson [28] and Szopiński and Bachnik [29], training content is also an important factor that affects training effectiveness. This is consistent with findings by Mohamad et al. [69] that some characteristics of training content should be considered in organizing online training, including the fulfillment of participant's needs, training priorities, participant's expectations, latest training materials, relevant training topics, and ability to manipulate sophisticated electronic media in attracting participants. Furthermore, Aziz and Selamat [70] found that other training characteristics including content relevancies, content familiarity, training reputation, training design, and training options also affected training effectiveness. Moreover, interesting characteristics of the online learning system are also considered to be important aspects that affect learning effectiveness [66]. Hence, these characteristics should be investigated in future research, especially using samples of school students.

Second, participants' individual characteristics affecting online training effectiveness were not investigated in the presented study. However, Anderson [28] and Szopiński and Bachnik [29] argued that participants' individual characteristics comprise one of the factors affecting online learning effectiveness. In fact, the presented research findings also demonstrated that participants' ability in online training could be related to individual characteristics affecting training effectiveness. These results are consistent with findings by Mohtar and Yunus [71], who found participants' training motivation to be an influential individual characteristic affecting the effectiveness of online training; furthermore, Yusof et al. [8] found that participants' computer skills and other individual characteristics affected online learning effectiveness. In addition, Husin et al. [72] demonstrated that participants' attitude to learning was the most important individual characteristic affecting online learning effectiveness. Additionally, Manoharan et al. [73] found that demographic variables including participants' age differences affected online learning effectiveness. If all things are considered, these findings can be used to carry educational systems to a brighter future. Hence, future researchers should consider these limitations when investigating online training effectiveness, especially among school students.

On the other hand, the research findings demonstrate an interesting future direction to sustain effective 4IR implementation in the educational system. Findings have shown that both online and classroom training can be effective among school students. Hence, blended training combining the face-to-face or traditional classroom setting and online training can have better impact on training effectiveness among school students. Blended training refers to a hybrid learning approach that combines the use of multiple approaches in a face-to-face setting and electronic learning technology including online learning [32,74]. Blended training has also been proven to be effective in training programs among employees and to be preferred by training organizers because of its capability to increase training performance

and decrease training costs [32,74]. For example, school students can attend blended training that requires them to perform physical activity using a face-to-face approach that also allowed the learning materials to be accessed online [57]. This can increase students' training performance and trainers' competencies while also sustaining effective 4IR implementation in the educational system.

6. Conclusions

The objectives of this study were to determine whether online learning could be effective if it is used as online training among Malaysian school students and to determine the trainers' characteristics perceived by participants in online and classroom training using pre-experimental research during COVID-19 because research to sustain effective 4IR implementation in the educational system for the post-pandemic era is essential. To achieve the research objectives, a webinar named "University Life" was organized as online training involving 150 secondary school students as the research participants. Online training effectiveness was assessed by determining the achievement of the training objective to increase academic motivation among participants. A paired sample *t*-test was used to determine the significant increases in academic motivation in pre- and post-evaluation among participants using instruments adapted from previous research; then, the effect of trainers' characteristics on online training effectiveness was tested using multiple linear regression. Trainers' characteristics perceived by participants in online and classroom training were also compared using a paired sample *t*-test. Findings indicated that online training was effective regardless of gender and race differences, and trainers' characteristics explained 40.5% of variance in online training effectiveness. However, participants preferred classroom training to online training, demonstrating the need to improve the quality of online training, especially the trainers' characteristics. These research findings have advanced the understanding of the online learning model proposed by previous scholars to be used for online training among school students, suggesting three main factors affecting its effectiveness: the training content, participants' individual characteristics, and trainers' characteristics. Empirically, these findings confirmed that trainers' characteristics explained 40.5% of variance in online training effectiveness. Trainers' interaction was the most important characteristic, followed by trainers' competency and attitude; trainers' attitude will not be significant if trainers' have sufficient competency and interaction. Hence, trainers' characteristics should be guided to improve online training effectiveness among school students. Hence, it can be concluded that online training effectiveness can be improved and should be organized continuously for additional education programs among school students. This study's results can also be considered to sustain effective 4IR implementation in the educational system for the post-pandemic era, such as by organizing online training among school students to supply additional competencies and values that are not covered in the formal educational setting, to consider appropriate learning theories in delivering online training, to support trainers in online training with advanced online learning systems that use blended learning, to invest in effective online trainers' through a train-for-trainer program, and to mandate certain characteristics of qualified trainers including the ability to interact with participants and competency to deliver online training.

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Institutional Review Board Statement: The research funder does not require ethical approval; hence, no approval from ethical committees was needed. However, the study was conducted in accordance with the Declaration of Helsinki; research participants, including the school students and their teachers, were informed about this research and provided their consent to participate in the pre-experimental research. The online training program used in pre-experimental research is registered with the National University of Malaysia's (Universiti Kebangsaan Malaysia/ UKM) formal portal for student activities named "i-star" with registration code C-SKPM2093-2020-137. To register the program, the university used its own committees to approve the program organization based on a few ethical guidelines that are similar to those of organizing ethical research.

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