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Factors Affecting the Level of Achieving Employability 4.0 of Hearing-Impaired Special Education Students

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Abstract: The use of IR4.0 digital technology, computers and smartphones are gradually changing the scope of employment. This requires special education students with impaired hearing who are enrolled in the Special Skills Certificate programme at Malaysian polytechnics to acquire and master digital skills that will meet the employer's needs. Therefore, this study is conducted to identify the factors that affect the level of achieving employability 4.0 of impaired hearing special education students in Malaysian polytechnics, from the perspectives of lecturers and employers. Quantitative methods are used in carrying out the study, and the data are analysed using the SPSS V26. The research instrument in the form of a questionnaire is distributed to the respondents and the contents are verified by two experts. This study involves a total of 71 Special Skills Certificate lecturers and 84 employers who have offered industrial training to the special education students with impaired hearing, who use computers and smartphones in their workplace. The analysis requirement test was carried out using a normality test and found that the entire data are normally distributed. Here are the results of the descriptive analysis: from the lecturer's perspective, the attitude of impaired hearing special education students towards the use of digital technology score a high average mean value of 4.18; from the employer's perspective, the required digital technology facilities of impaired hearing special education students score a high average value mean 4.36. Meanwhile, the results by inferential analysis using independent t-test showing a significant difference in teaching experience by lecturers. Students can explore the content of the subjects through the use of software and digital technology applications based on their lecturers' experience in teaching. Therefore, the factors that affect the level of achieving employability 4.0 should always be in line with IR4.0 technology that meets the needs of employers. The findings could be used another researcher to identify the other factors affecting the level of achieving employability 4.0 of hearing-impaired special education students in Malaysian polytechnic to keep student's employability 4.0 aligned with the employers wished.

Keywords: Employability 4.0, digital technology, IR4.0, hearing impaired special education students

1. Introduction

An individual with impaired hearing is one who is born with a hearing disability that causes him or her to have difficulty in recognising the sounds of a language, and he or she cannot hear clearly other people's conversations (Alias et al., 2016). Hearing loss is not only a great handicap to communication, but also greatly reduces the quality of an affected individual's personal and social life (Hamid, 2012). Individuals with impaired hearing have three types of disabilities: inability to hear, speak and think like normal children (Mohamed, 2006). In general, the community surrounding these special education students is also a factor that can improve the latter's profession.

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The explosion of industrial revolution 4.0 (IR4.0) is being felt throughout the whole country, and it touches people from all walks of life. As such, concerted efforts must be made to prepare students to face the new employment landscape by improving their skills (upskilling) and mastering new skills (reskilling) (Wilfried, 2018). The successful implementation of IR4.0 is highly dependent on the ability of the workforce to apply and optimise the use of advanced technologies, particularly those of digital nature, in the work environment. The role of TVET is pivotal in training students for the IR4.0 work environment (Amiron, Latib & Subari, 2019). The skills acquired by students in educational institutions can be efficiently practised and further improved when undergoing industrial training (Yusof et al., 2013). Industrial training provides a good opportunity for students to try out their skills in a real work environment (Yusof & Mohiddin, 2018). Students who have undergone industrial training gain practical work experiences; they can adapt to the work environment more easily than those without exposure to industrial training (Effah, et al., 2014).

The purpose of this study is to identify the factors that affect the level of achieving employability 4.0 for special education students with impaired hearing in Malaysian polytechnics, from the perspective of lecturers and employers. The findings of the two different perspectives are important; the special education students with impaired hearing can then be trained accordingly to meet the requisites of employability 4.0 so that they are easily absorbed by the job market in this era of IR4.0.

2. Background of Problem

Changes in digital technology have big impacts on the employment market and educational institutions. In 2022, the use of digital technology in the context of special education students plays an important role in shaping the lives of those students for a better future (Talib, Sunar & Mohamed, 2019). Tohara et al. (2021) state that there are limited digital technology facilities due to the lack of good infrastructure such as fast internet access as well as efficient software and applications installed in computers and smartphones. According to past studies, Mustafa & Qistin (2009) and Halim (2013) found that the technological facility infrastructure provided by the polytechnic to Special Skills Certificate students was moderate. This implies that the facility provided was still unsatisfactory and needs improvement in terms of accessibility and in accordance with IR4.0 special requirements for the students. These unresolved barriers will create a digital divide between normal students and special education students with hearing problems who may miss the opportunity of exposure to IR4.0 technologies (Andreasson, 2015). Digital technology facilities should be issued to these students since IR4.0 technology is very beneficial to people with special needs, especially students because it is in line with the 12th Malaysia Plan that is including differently-abled people in education, occupation, and digital entrepreneurship to lead the country's economic development (Economy Planning Unit, 2021).

Students' experience in the institutions of learning is important and should contribute to the good of their future careers. Zainuna et al. (2021) state that the lack of work experience among Malaysian polytechnic special education students with impaired hearing is the main factor that hinders them from adapting well to a new work environment. Next, Khairi, Redzuan & Hashim (2017) state that Special Skills Certificate students that are under industrial training also require specific supervision in terms of the environment such as special workspace, lighting and air circulation, also special tools needed to be constrained for the employers to provide a suitable working environment for them. In addition, differently abled workers have issues with teamwork, providing satisfactory work quality, adherence to work attendance and work loyalty. Besides, Meresman & Ullman (2020) have this comment: very few employers provide a comfortable work environment with appropriate space, work, and technologies suitable for disabled workers; consequently, the latter are compelled to adjust and adapt in no small ways to the environment provided. Failure to adapt to working conditions forced the Special skills certificate graduates to withdraw from the workforce (Ling, Hamid & Chuan, 2020). Therefore, providing ideal working conditions for the workers ensures their competency in terms of psychomotor and cognitive skills (Abdul Razak, Noordin & Khanan, 2022).

Magrin, Marini & Nicolotti (2019) state that there are several factors that affect the employability of special education students with impaired hearing, one of which is the role of educational institutions in producing quality graduates. Yahaya & Latiff (2021) state that poor internet access and teaching of inferior quality lecturers could affect the learning of special education students with impaired hearing in mastering digital skills. Moreover, specific multimedia available for special education students in polytechnic do little to encourage them to be interested in their field and it is shown that the lecturers are less active and creative in providing desirable digital teaching and learning to their students (Yahya & Helen, 2017). This will bring difficulty to special education students, especially learning-impaired students due to issues with catching up with the learning methods in class (Azman et al, 2020). The use of smart technology such as computers and smart in teaching can increase the effectiveness of special education students' learning (Baglama, Haksiz & Uzunboylu, 2017).

Sahar and Arshian (2016) opine that the user's learning attitude is an important element that will lead to the successful use of new software and applications. However, Kadir, Masri & Salleh (2020) states that the absence of user-friendly digital software in the Special Skills Certificate curriculum in Malaysian polytechnics caused a lack of interest in learning-impaired students for their learning materials. This condition will lead students to prefer to use digital technology for personal purposes and entertainment rather than for acquiring knowledge. Abdallah, Lynn & Faten (2021) state that innovative impartation of software and hardware technology would help special education

students with impaired hearing to have the same opportunities as normal students to apply digital technology in their daily lives including in their learning.

Therefore, this study is conducted to identify the factors that will influence the level of achieving employability 4.0 by special education students with impaired hearing in Malaysian polytechnics from the perspectives of the lecturers and employers. Success in producing a competent workforce is important evidence that special education graduates are capable of utilising TVET to contribute to the country's economic growth; they too are a workforce that has sufficient skills and knowledge in keeping up with the latest technological development.

2.1 Employability 4.0

According to Aliu et al. (2021), employability 4.0 is a graduate who has various digital skills and knowledge to land a job in various industrial sectors after graduation. Wymann & Schellinger (2021) define employability 4.0 differently; it means that individuals entering the job market need to have new digital skills. In addition, Pujiwati et al. (2021) state that in the employability 4.0 environment, it is necessary for individuals to master skills, acquire new knowledge and possess the right attitudes to get a job. Paul (2021) states that the goal of employability 4.0 is to build an educational system with a digital agenda that is in line with the needs of the industry. Therefore, it is essential for educational institutions to act fast and produce graduates who are compliant with employability 4.0.

2.2 Factors that Affect the Level of Achievement of Employability 4.0 of Hearing-Impaired Special Education Students

There are various factors that affect the level of achievement of employability 4.0 of special education students with impaired hearing. Rosli et al. (2017) emphasises the accessibility of digital technology facilities to special education students with impaired hearing so that they can improve their computer and smartphone skills, and increase their knowledge of things. Talib, Sunar & Mohamed (2019) believe that there are five types of IR4.0 technology that must be mastered by disabled people so that they can adapt to the digital work environment: augmented reality (AR), virtual reality (VR), internet of things (IoT), cloud computing, and cybersecurity.

A work environment conducive to industrial training for special education students with impaired hearing is highly desirable so that they can gain knowledge and hone skills that meet the requirements of the employers (Samian et al., 2013). Furthermore, Makhbul, Hasun & Latiff (2018) state that an ergonomic work environment is one of the factors of human capital development in the era of IR4.0. Students undergoing industrial training in a drastically changed work environment would be required to acquire acknowledge and skills that are in line with the standards of IR4.0 (Abdullah, Humaidi & Shahrom, 2020). An ergonomic environment that is IR4.0 compliant includes these aspects: good ventilation systems, energy saving, reasonable working hours and rules, comfortable workspaces, adequate lighting systems, appropriate body positions, and acoustics that insulate the workplace from outside noises (Makhbul, Hasun & Latiff (2018), 2018).

Khalik & Said (2021) emphasise that virtual teaching and learning are more suitable for special education students with impaired hearing in Malaysian polytechnics. Nichole (2019) states that specific software and applications installed on computers and smartphones can be easily accessed by special education students with impaired hearing, which would improve their learning. The use of computers and smartphones in the teaching and learning process is a more interesting approach, which will stimulate students' minds to think creatively (Bakar, 2016). In addition, Adikun & Nzima (2021) emphasise that special education students with impaired hearing should be given training opportunities in using digital technology that meets the requirements of IR4.0.

Anas & Mukhtar (2016) state that a right is one of the factors that determine special education students' effective use of digital technology, which will increase their motivation to obtain a better education. Shapri (2019) states that students' attitudes towards the use of digital technology are dependent on three aspects, namely enjoyment, ease of use, and usefulness. Students enjoy using digital technology that encompasses an interesting variety of software and applications in delivering the content of the lessons (Tasir, Harun & Yen, 2006). When a person thinks that digital technology is easy to use, he or she will be drawn to that digital device and uses it more efficiently (Shapri, 2019). A person is very likely to adopt a digital technology which he or she believes that it can improve his or her work performance.

3. Methodology

This study used an entirely quantitative study in which the researcher used a questionnaire as a research instrument. The questionnaire of this study was adapted from a previous study which contained three constructs by each respondent from Special Skills Certificate lectures and employers. Table 1 shows the construct that has been developed by the researcher by adapting from a previous study for a lecture sample.

Table 1 - Construct Developed by Researcher for Lecturers Sample

Construct	Adapted From
Digital Technology Facilities Needed by Special Education Students	Rosli et al. (2017) and Talib, Sunar & Mohamed (2019).
The Quality of the Lecturer's Digital Teaching and Learning towards Special Education Students with Impaired Hearing	Khalik & Said (2021), Nicole (2019)
The Attitude of Special Education Students with Impaired Hearing towards the Use of Digital Technology	Shapri (2019) and Tasir, Harun & Yen (2006)

Table 2 shows the construct that has been developed by the researcher by adapting from the previous study for employers' samples.

Table 2 - Construct Developed by Researcher for Employers Sample

Construct	Adapted From
Digital Technology Facilities Needed by Special Education Students	Rosli et al. (2017) and Talib, Sunar & Mohamed (2019).
Industrial Training in an Environment Conducive to Working for Special Education Students with Impaired Hearing	Makhbul, Hasun & Latiff (2018)
The Attitude of Special Education Students with Impaired Hearing towards the Use of Digital Technology	Shapri (2019) and Tasir, Harun & Yen (2006)

The samples of lecturers and employers are chosen by the researcher using the total population sampling method. This means the entire population of lecturers and employers is used as the study sample. According to Etikan, Musa & Alkassim (2016), total population sampling is a sampling technique where it involves the entire population that meets the criteria in research, and it is used in a small population. Therefore, it is sufficient for the researcher to use the entire population of Special Skills Certificate lecturers and employers as a sample in this study. The lecturer population is 71 Special Skills Certificate lecturers from five institutions: Ibrahim Sultan Polytechnic, Kota Kinabalu Polytechnic, Tuanku Syed Sirajuddin Polytechnic, Ungku Omar Polytechnic, and Sultan Salahuddin Abdul Aziz Shah Polytechnic. The 84 employers are the organisations that have offered industrial training to special education students with impaired hearing that use computers and smartphones at the workplace.

In this study, the instrument was given to each respondent using multiple choice and a 5-point Likert scale where each scale was given a corresponding score value of 1=Strongly Disagree, 2= Disagree, 3= Neither/Nor Agree, 4=Agree, 5=Strongly Agree. Questionnaires were distributed to targeted lecturers and employers using Google Forms. The number of items questionnaire by each respondent is shown in Table 3 and Table 4.

Table 3 - Instrument for Lecturers Sample

Construct	Number of Items
Digital Technology Facilities Needed by Special Education Students	20
The Quality of the Lecturer's Digital Teaching and Learning towards Special Education Students with Impaired Hearing	21
The Attitude of Special Education Students with Impaired Hearing towards the Use of Digital Technology	11
Total	**52**

Table 4 - Instrument for Employers Sample

Construct	Number of Items
Digital Technology Facilities Needed by Special Education Students	18
Industrial Training in an Environment Conducive to Working for Special Education Students with Impaired Hearing	13
The Attitude of Special Education Students with Impaired Hearing towards the Use of Digital Technology	11
Total	**42**

Descriptive and inferential statistical analysis methods are employed to analyse the data using the SPSS V26. The descriptive analysis method is used to obtain mean values and standard deviations, while the method of inferential statistics is used to test and predict data based on descriptive data. Two expert lecturers from the TVET School of Education, Universiti Teknologi Malaysia are engaged in determining the content validity. A total of 20 people for each sample of lecturers and employers are used for determining the instrument reliability. All the respondents for this reliability test are excluded from the actual study to avoid repetition of the same answers, which do not show the actual level of mastery of the respondents. The reliability of the questionnaire is determined through Cronbach's Alpha values: the lecturer sample is 0.89, and the employer sample is 0.85. These figures show that the instrument for the sample of lecturers and employers has a high level of reliability supported by Hair et al. (2003) have outlined a reliability value equal to or greater than 0.7 that can be used as a study instrument. The normality test is also performed to determine whether the data are normally or non-normally distributed (Chua, 2014). Based on this study, the researcher found that the entire data are normally distributed; each sub-construct of the factors for the lecturer's sample studied shows a value of $p>0.05$. Based on the normality test results, the independent t-test is used to analyse the significant difference in gender and experience of teaching among the lectures sample, while the one-way ANOVA test is used to determine the significant difference for the programmes taught by the lecturers.

4. Findings

This section includes the findings of the study and discussions, which are associated with the lecturers' and employers' perspectives on the factors that influence the level of employability of special education students with impaired hearing in Malaysian polytechnics.

4.1 Research Findings of a Sample of Lecturers

Table 5 shows the demographics of the study respondents. The total number of respondents who are lecturers is 51, which consists of men (n=20, 39.2%) and women (n= 31, 60.8%). These are the course programmes taught by the lecturers: hotel and catering (n=21, 41.2%); construction (n=13, 25.5%); fashion and clothing design (n=6, 11.8%); graphic design (n = 4, 7.8%); as well as hotel and catering, graphic design and fashion and clothing design (n=2, 3.9%). Most lecturers indicate that they have more than 10 years' experience of teaching special education students with impaired hearing, (n=28, 54.9%) while a smaller number of them possess less than 10 years of teaching experience (n=23, 45.1%).

Table 5 - Demographics of lecturer respondents

Demographics	Number	%
Gender		
Men	20	39.2
Female	31	60.8
Program taught		
Hotel and catering	21	41.2
Construction	13	25.5
Fashion and clothing design	6	11.8
Graphic design	4	7.8
Hotel and catering, fashion and clothing design and graphic design.	2	3.9
Teaching experience		
Less than 10 years	23	45.1
More than 10 years	28	54.9

Table 6 to Table 8 show the descriptive data analyses of factors from the lecturer's perspective, which contain three constructs: digital technology facilities required by special education students with impaired hearing; the lecturers' quality of teaching digital subjects to the special education students with impaired hearing; and the attitude of special education students with impaired hearing to the use of digital technology. The range of mean scores and interpretations used in this study are divided into three categories which researcher took from Hadiyanto et al. (2013): high (M=3.68-5.00), moderate (M=2.34-3.67) and weak (M=1.00-2.33).

4.1.1 Digital Technology Facilities Needed by Special Education Students with Impaired Hearing from The Lecturer's Perspective

Table 6 contains two sub-constructs which are computer and smartphone facilities and IR4.0 technology facilities.

Table 6 - Descriptive analysis of digital technology facilities needed by special education students with impaired hearing from the lecturer's perspective.

No.	Item	Min	SD	Interpretation
	Computer and Smartphone Facilities			
G1	It is important for special education students to be provided with computer facilities nowadays.	4.43	0.73	High
G2	Students are provided with computer facilities during class sessions that require computer use.	4.39	0.63	High
G3	The computer facilities at the polytechnic are working well.	4.29	0.61	High
G4	Students are allowed to use smartphone applications when performing assignments during class time.	4.37	0.72	High
G5	Lecturers are ready to help if students face difficulties when using computer software.	4.39	0.72	High
G6	Lecturers are ready to help if a computer component at the polytechnic breaks down.	3.74	1.18	High
	IR4.0 Technology Facility			
H1	It is important for students to be exposed to the facilities of Virtual Reality (VR) technology nowadays.	3.67	1.09	High
H2	Students can easily obtain information if provided with animation software that converts speech into sign language.	4.06	0.86	High
H3	It is important for students to be exposed to the facilities of Augmented Reality (AR) technology nowadays.	4.02	1.00	High
H4	A QR scan code helps students view video animations.	4.06	0.86	High
H5	QR scan codes help students get information.	4.04	1.04	High
H6	It is important for students to be exposed to the Internet of Things (IoT) technology facilities nowadays.	4.00	1.01	High
H7	Wi-Fi facilities at the polytechnic are available to students.	3.19	1.13	Moderate
H8	Students are given free Wi-Fi access by the polytechnic.	3.61	1.13	Moderate
H9	Students can easily obtain information if online software is provided that converts speech to text display.	3.88	0.86	High
H10	Students can easily obtain information if an online application is provided that converts speech to text display.	3.88	1.07	High
H11	It is important for students to be exposed to the facility of cloud computing technology nowadays.	4.43	0.64	High
H12	Students know how to download or upload a file using google drive.	4.49	0.58	High
H13	It is important for students to be exposed to cyber-security technology these days.	4.06	1.10	High
H14	Students install antivirus software in their computers.	4.10	0.85	High
	Average amount	**4.12**	**0.28**	**High**

Based on the computer and smartphone sub-construct, item G1 shows a high mean value and SD value; it is at a high level of interpretation (M=4.43, SD=0.73). With regard to the IR4.0 technology facility sub-construct items H1 to H14, item H12 shows a high mean value and SD value (M=4.49, SD=0.58); it is at a high level of interpretation. Item H7 shows the lowest mean value (M=3.19, SD=1.13) and is at a moderate level of interpretation.

4.1.2 The Quality of the Lecturer's Digital Teaching and Learning Towards Special Education Students with Impaired Hearing from The Lecturer's Perspective

Table 7 contains two sub-constructs, which are digital teaching and learning, and syllabus content that meets the requirements of IR4.0.

Table 7 - Descriptive analysis of the quality of teaching and digital learning of lecturers towards students special education with impaired hearing from the lecturer's perspective.

No.	Item	Min	SD	Interpretation
	Digital teaching and learning			
I1	Students are allowed to use smartphone applications when the lecturer is teaching.	3.94	1.03	High
I2	Students are allowed to use computer software when the lecturer is teaching.	4.47	0.61	High
I3	Students are given digital notes or modules when the lecturer is teaching.	4.25	0.72	High
I4	Students can attend classes online when the lecturer is teaching.	4.00	1.07	High
I5	Students are exposed to a demonstration through a video approach when the lecturer is teaching.	4.22	0.79	High
I6	Students were exposed to a demonstration through a digital simulation approach when the lecturer was teaching.	3.33	1.22	Moderate
I7	Digital technology methods encourage special education students to learn.	4.18	0.68	High
I8	Learning using computer software can improve student understanding.	3.67	0.73	High
I9	Learning using smartphone applications can improve student understanding.	3.94	0.73	High
I10	Learning using computer software can improve student achievement.	4.20	0.66	High
I11	Learning using smartphone applications can improve student achievement.	4.11	0.74	High
I12	Learning through digital technology is suitable because it saves student’s time.	3.96	0.69	High
I13	The use of computer software can encourage students' interest in learning.	4.10	0.73	High
I14	The use of smartphone applications can encourage students' interest in learning.	4.00	0.82	High
I15	Students are able to adapt to the learning environment in the classroom that involves the use of digital technology.	4.29	0.73	High
	Syllabus content that meets the requirements of IR4.0.			
J1	Students are provided with syllabus content that is in line with the requirements of the Ministry of Higher Education Malaysia (KPTM)	3.80	1.00	High
J2	Physical deficiencies faced by special education students correspond to the content of the given syllabus.	4.41	0.73	High
J3	Syllabus content involves the use of computers and smartphones for specific topics.	4.43	0.64	High
J4	The content of the syllabus provided should be related to the current IR4.0 technology requirements.	4.49	0.58	High
J5	The content of the syllabus follows the requirements of the industry.	3.63	1.29	Moderate
J6	The content of the syllabus can stimulate students' interest to better master the topics studied.	4.31	0.70	High
	Total Average	**4.11**	**0.41**	**High**

Based on the sub-construct of the quality of digital teaching and learning, which comprises items I1 to I15, item I2 scores a high mean value and SD value (M=4.47, SD=0.61); it is at a high level of interpretation. On the other hand, item I6 registers the lowest mean value and SD value (M=3.33, SP=1.22), with a moderate level of interpretation. Based on the syllabus content sub-construct that meets the requirements of IR4.0, which consists of items J1 to J6, item J4 records a high mean value and SD value (M=4.49, SD=0.58); it is at a high level of interpretation. Item J5 shows the lowest mean value and SD value (M=3.63, SD= 1.29), with a moderate level of interpretation.

4.1.3 The Attitude of Special Education Students with Impaired Hearing towards the Use of Digital Technology from The Lecturer's Perspective

Table 8 contains three sub-constructs, which are enjoyment, ease of use, and usefulness of using digital technology for special education students with impaired hearing from the lecturer's perspective.

Table 8 - Descriptive analysis of the attitude of special education students with impaired hearing towards the use of digital technology from the lecturer's perspective

No.	Item	Min	SD	Interpretation
	The enjoyment of using digital technology			
K1	The use of digital technology is comfortable for special education students.	4.06	1.00	High
K2	The use of digital technology can eliminate boredom for special education students.	4.51	0.61	High
K3	The digital technology used by special education students is user-friendly.	4.27	0.72	High
K4	The use of digital technology is easy to use for special education students.	4.16	1.03	High
	Ease of use of digital technology			
L1	Students do tasks more easily by using digital technology.	4.14	0.80	High
L2	Students can perform a task that involves the use of digital technology efficiently.	3.63	1.14	Moderate
L3	Students can perform tasks that involve the use of digital technology within the specified time.	4.51	0.61	High
	The usefulness of using digital technology			
M1	The use of digital technology such as computers and smartphones help students demonstrate positive behaviour.	4.27	0.69	High
M2	Students show positive emotions when using digital technology.	4.23	0.71	High
M3	Students show high motivation when they successfully complete a task that involves the use of digital technology.	4.06	0.68	High
M4	Students show high physical ability in using digital technology.	4.20	0.77	High
	Total Average	**4.18**	**0.49**	**High**

Based on the enjoyment sub-construct of using digital technology which comprises items K1 to K4, item K2 shows a high mean value and SD (M=4.51, SD=0.61); it is at a high level of interpretation. For the sub-construct of ease of using digital technology which consists of items L1 to L4, item L3 shows a high mean value and SD (M=4.51, SD=0.61); it is at a high level of interpretation. Item L2 shows the lowest mean value and SD (M=3.63, SD=1.14) with a moderate level of interpretation. For the sub-construct of the usefulness of using digital technology which comprises items M1 to M4, item M1 shows a high mean value and SD value (M=4.27, SD=0.69); it is at a high level of interpretation.

Overall, there are three factors that affect the level of employability 4.0 of special education students with impaired hearing from the lecturer's perspective: digital technology facility, the quality of digital teaching and learning, and the attitude of students towards the use of digital technology. Based on Table 9, the student's attitude towards the use of digital technology (M=4.18, SD=0.37) shows a high mean value compared to other factors. This shows that the attitude of special education students with impaired hearing towards the use of digital technology is the main factor that influences the level of employability 4.0, based on the lecturer's perspective.

Table 9 - A descriptive analysis of the factors affecting the level of achieving employability 4.0 of special education students from the lecturer's perspective.

Factors that affect the level of achievement of employability 4.0 from the lecturer's perspective.	Min	SD	Interpretation
Digital technology facilities needed by special education students with impaired hearing	4.05	0.28	High
The quality of teaching and digital learning of lecturers for special education students with impaired hearing.	4.08	0.33	High
Attitudes of special education students with impaired hearing towards the use of digital technology.	4.18	0.37	High

Table 10 shows the results of an independent t-test used to determine the gender differences of lecturers on the factors that affect the level of achieving employability 4.0 of special education students with impaired hearing.

Table 10 - Independent t-test to determine the gender differences of lecturers on the factors that affect the level of achieving employability 4.0 of special education students

Factors that affect the level of achievement of employability 4.0 from the lecturer's perspective	*Gender	Min	*p*
Digital technology facilities needed by special education students with impaired hearing.	M(n1=20) F(n2=31)	4.07 4.04	0.82
The quality of teaching and digital learning of lecturers for special education students with impaired hearing.	M(n1=20) F(n2=31)	4.12 4.05	0.41
Attitudes of special education students with impaired hearing towards the use of digital technology.	M(n1=20) F(n2=31)	4.25 4.14	0.30

**Indicator: M=male, F=female*

According to the independent t-test data analysis results in Table 10, there is no significant difference between the factors that affect the level of achievement of employability 4.0 based on the lecturer's gender. Judging from the significance *p* values obtained for the digital technology facilities (0.82, $p \leq 0.05$), the quality of digital teaching and learning (0.41, $p \leq 0.05$) and students' attitudes towards the use of digital technology (0.30, $p \leq 0.05$), there is no significance. This shows that the factors affecting the level of achievement of employability 4.0 of special education students with impaired hearing are the same for both genders of the lecturers. Table 11 shows the One-way ANOVA test used to determine the difference between the programmes taught by the lecturers and the factors that affect the level of achieving employability 4.0 special education students with impaired hearing.

Table 11 - One-way ANOVA test to determine the difference between the programmes taught by the lecturers and the factors that affect the level of achieving employability 4.0 special education students

Factors That Influence the Level of Employability Achievement 4.0 Lecturer's Perspective	Source	df	*p*
Digital technology facilities needed by special education students with impaired hearing.	Between groups 0.25	5	0.69
	In Group 3.62	45	
	Amount 3.87	50	
The quality of teaching and digital learning of lecturers for special education students with impaired hearing.	Between groups 0.43	5	0.59
	In Group 5.19	45	
	Amount 5.62	50	
Attitudes of special education students with impaired hearing towards the use of digital technology.	Between groups 0.46	5	0.67
	In Group 6.55	45	
	Amount 7.00	50	

The results of the analysis of the One-way ANOVA test show that the value of Asym. Sig. (p) is greater than 0.05 ($p \leq 0.05$), which means it is not significant. All the three factors show no significance: digital technology facility ($0.69 \leq 0.05$), the quality of digital teaching and learning ($0.59 \leq 0.05$), and the attitude of students towards the use of digital technology ($0.67 \leq 0.05$). It means that there is no difference regarding the factors that affect the level of achievement of employability 4.0 based on the programmes taught by the lecturers. Table 12 shows an independent t-test used to determine the effect of different teaching experiences special education students on the factors that affect the level of employability 4.0.

Table 12 - Independent t-test to determine the effect of different teaching experiences special education students on the factors that affect the level of achieving employability 4.0.

Factors that affect the level of achievement of employability 4.0 lecturer's perspective.	Experience	Min	*p*
Digital technology facilities needed by special education students with impaired hearing.	Less than 10 years (n=23)	3.95	0.03
	More than 10 years (n=28)	4.14	
The quality of teaching and digital learning of lecturers for special education students with impaired hearing.	Less than 10 years (n=23)	3.96	0.00
	More than 10 years (n=28)	4.18	
Attitudes of special education students with impaired hearing towards the use of digital technology.	Less than 10 years (n=23)	4.03	0.02
	More than 10 years (n=28)	4.30	

The results of the independent t-test data analysis show that there is a significant difference between the factors that affect the level of achieving employability 4.0 of special education students with impaired hearing based on the lecturer's teaching experience. Judging from the significance p-value obtained for the digital technology facility (0.03, $p \leq 0.05$), the quality of digital teaching and learning (0.00, $p \leq 0.05$) and the attitude of students towards the use of digital technology (0.02, $p \leq 0.05$), there is significance. In addition, the mean values in Table 8 indicate that lecturers with more than 10 years of teaching experience record a higher mean compared to lecturers with less than 10 years of teaching experience.

4.2 Findings of the Employer Sample Study

Table 13 shows the demographics of the study respondents. The total number of study respondents of the employer sample is 64 people comprising men (n=38, 59.4%) and women (n= 26, 40.6%). The employers' fields or businesses are as follows: graphic design (n=17, 26.6%), construction (n=15, 23.4%), fashion and clothing design (n=12, 18.7%), hotels (n=11, 17.2%), and mechanical maintenance (n=9, 14.1%). Based on the experience of supervising special education students with impaired hearing, most employers indicate that they have less than 10 years of experience in supervising students (n=52, 81.2%) compared to those with more than 10 years of supervising experience (n=12, 18.7%).

Table 13 - Demographic findings of the employer sample.

Demographics	Frequency	%
Gender		
Men	38	59.4
Female	26	40.6
Field work		
Hotel	11	17.2
Construction	15	23.4
Fashion and clothing design	12	18.7
Graphic design	17	26.6
Mechanical maintenance	9	14.1
Supervisory experience		
Less than 10 years	52	81.2
More than 10 years	12	18.7

Table 14 to Table 16 show a descriptive analysis of the factors affecting the level of achieving employability 4.0 of special education students with impaired hearing in Malaysian polytechnics, according to the employer's perspective, which contains three constructs: digital technology facilities, industrial training in an environment conducive to working, and the attitudes towards the use of digital technology. The range of mean scores and interpretations used in this study are divided into three categories which researcher took from Hadiyanto et al. (2013): high (M=3.68-5.00), moderate (M=2.34-3.67) and weak (M=1.00-2.33). Based on the findings of the study, the researcher shows the mean values of different items.

Digital Technology Facilities Needed by Special Education Students with Impaired Hearing from the Employer's Perspective

Table 14 shows a descriptive analysis of the mean values and standard deviations of the items that contain two sub-constructs, namely computer and smartphone facilities, and IR4.0 technology facilities.

Table 14 - Descriptive analysis of the mean value and standard deviation of the items for the construct of digital technology facilities needed by special education students with impaired hearing from the employer's perspective

No.	Item	Min	SD	Interpretation
	Computer and smartphone facilities			
G1	Computer facilities are important to today's special education students undergoing industrial training.	4.68	0.46	High
G2	Students are provided with computer facilities at their workplace.	4.28	0.76	High
G3	Students are allowed to use smartphone applications when performing assignments during working hours.	3.55	1.49	Moderate
G4	Supervisors are ready to help if students encounter difficulties when using computer software.	4.14	0.87	High
G5	Supervisors are ready to help if computer components are damaged.	4.56	0.59	High
	IR4.0 technology facility			
H1	It is important for students to be exposed to the facilities of Virtual Reality (VR) technology nowadays.	4.40	0.58	High
H2	Students can easily obtain information if provided with animation software that converts speech into sign language.	4.41	0.63	High
H3	It is important for students to be exposed to the facilities of Augmented Reality (AR) technology nowadays.	4.37	0.67	High
H4	A QR scan code helps students view video animations.	4.36	0.60	High
H5	QR scan codes help students get information.	4.45	0.50	High
H6	It is important for students to be exposed to the Internet of Things (IoT) technology facilities nowadays.	4.45	0.50	High
H7	Wi-Fi facilities at work are provided to students.	4.56	0.61	High
H8	Students can easily obtain information if online software is provided that converts speech to text display.	4.39	0.58	High
H9	Students can easily obtain information if an online application is provided that converts speech to text display.	4.39	0.49	High
H10	It is important for students to be exposed to the facility of cloud computing technology nowadays.	4.50	0.64	High
H11	Students can download or upload a file using google drive.	4.50	0.56	High
H12	It is important for students to be exposed to cyber-security technology these days.	4.41	0.66	High
H13	Students install antivirus software in their computers.	4.45	0.66	High
	Total Average	**4.36**	**0.34**	**High**

Based on the sub-construct of computer and smartphone facilities, which comprise items G1 to G5, item G1 shows a high mean score and SD value (M=4.68, SD=0.46); it has a high level of interpretation. Item G3 shows the lowest mean value and SD (M=3.55, SD=1.49) with a moderate level of interpretation. For the IR4.0 technological facility sub-construct, which consists of items H1 to H14, item H7 scores a high mean value and SD (M=4.56, SD=0.51); it is at a high level of interpretation.

Industrial Training in an Environment Conducive to Working for Special Education Students with Impaired Hearing from the Employer's Perspective

Table 15 shows a descriptive analysis of the mean values and standard deviations of the items that contain two sub-constructs, namely the ergonomic workplace environment and workplace regulations.

Table 15 - Descriptive analysis of the mean value and standard deviation of the items for industrial training in a environment conducive to working for special education students with impaired hearing from the employer's perspective.

No.	Item	Min	SD	Interpretation
	Ergonomic workplace environment			
I1	Students are able to adapt to a work environment that involves the	4.17	0.86	High

	use of digital technology.			
I2	Students ensure that the work space is always clean.	3.64	1.63	Moderate
I3	Students are provided with a comfortable workspace.	4.43	0.81	High
I4	Students are provided with a lighting system that follows workplace lighting standards.	4.22	0.99	High
I5	Students are provided with a good ventilation system.	4.26	0.99	High
I6	Students show a comfortable body position during work hours.	4.37	0.84	High
I7	Students do not waste water during work hours.	3.94	1.27	High
I8	Students do not waste electricity during working hours.	4.42	0.81	High
I9	Students are provided with a rest room to relax.	3.95	1.21	High
I10	The student workspace is protected from noise from outside the workplace.	3.84	1.31	High
	Rules at work			
J1	Students adhere to the set work schedule.	4.11	1.22	High
J2	Students obey the work rules set by the employer.	4.12	1.29	High
J3	The presence of students at work throughout the industrial training is quite satisfactory.	4.18	0.94	High
	Total Average	**4.06**	**0.47**	**High**

Based on the ergonomic workplace environment sub-construct, which comprises items I1 to I10, item I8 shows a high mean value and SD (M=4.42, SD=0.81); it is at a high level of interpretation. Item I10 shows the lowest mean score and SD value (M=3.84, SD=1.31) with a moderate level of interpretation. For the sub-construct of rules in the workplace, which consists of items J1 to J3, item J2 shows a high mean value (M=4.18, SD=0.94) and has a high level of interpretation.

Attitudes of Special Education Students with Impaired Hearing towards the Use of Digital Technology from the Employer's Perspective

Table 16 shows a descriptive analysis of the mean values and standard deviations of the items that contain three sub-constructs, namely the enjoyment of using digital technology, the ease of using digital technology, and the usefulness of using digital technology.

Table 16 - Descriptive analysis of the mean value and standard deviation of the items for the attitudes of special education students with impaired hearing towards the use of digital technology from the employer's perspective.

No	Item	Min	SP	Interpretation
	The enjoyment of using digital technology.			
K1	The use of digital technology is comfortable for special education students.	4.52	0.59	High
K2	The use of digital technology can eliminate boredom for special education students.	4.48	0.59	High
K3	The digital technology used by special education students is user-friendly.	3.64	1.60	Moderate
K4	The use of digital technology is easy to use for special education students.	4.33	0.75	High
	Ease of use of digital technology.			
L1	Students do tasks more easily by using digital technology.	3.67	1.24	High
L2	Students can perform a task efficiently through the use of digital technology.	4.20	0.71	High
L3	Students can perform tasks that involve the use of digital technology within the specified time.	3.58	1.48	Moderate
	The usefulness of using digital technology.			
M1	The use of digital technology such as computers and smartphones help students demonstrate positive behaviour.	4.23	0.83	High
M2	Students show positive emotions when using digital technology.	4.45	0.56	High
M3	Students show high motivation when they successfully complete a task that involves the use of digital technology.	4.42	0.61	High
M4	Students demonstrate high physical ability while using digital technology.	4.48	0.56	High
	Total Average	**4.15**	**0.56**	**High**

Based on the sub-construct of enjoyment of using digital technology, which comprises items K1 to K4, item K3 shows a high mean value and SD (M=4.59, SD=0.55); it has a high level of interpretation. Meanwhile, item K3 shows the lowest mean score and SD value (M=3.64, SD=1.60) with a moderate level of interpretation. For the sub-construct of ease of using digital technology, which consists of items L1 to L3, item L3 shows a high mean value and SD (M=4.28, SD=0.63); it is at a high level of interpretation. Item L3 shows the lowest mean value and SD (M=3.58, SD=1.48) with a moderate level of interpretation. For the sub-construct of the usefulness of using technology items which comprises M1 to M4, item M4 shows a high mean value and SD (M=4.48, SD=0.56); it is at a high level of interpretation.

Overall, there are three factors that affect the level of employability 4.0 of special education students with impaired hearing from the employer's perspective: digital technology facilities, industrial training in an environment conducive to working, and student attitudes towards the use of digital technology. Based on Table 17, digital technology facilities needed by special education students with impaired hearing from the employer's perspective record the highest mean value (M=4.36, SD=0.34) compared to other factors studied.

Table 17 - Summary of descriptive analysis of factors that affect the level of achievement of employability 4.0 of special education students with impaired hearing from the employer's perspective.

Factors that affect the level of achievement of employability 4.0 from the employer's perspective.	Min	SD	Interpretation
Digital technology facilities needed by special education students with impaired hearing.	4.36	0.34	High
Industrial training in a conducive workplace environment to special education students with impaired hearing.	4.06	0.47	High
Attitudes of special education students with impaired hearing. towards the use of digital technology.	4.15	0.56	High

4.3 Discussions

There are two subtopics discussed by the researcher, which are the lecturers' and employers' perspectives on the factors that affect the level of employability 4.0 of special education students with impaired hearing in Malaysian polytechnics.

4.3.1 Lecturer's Perspective on The Factors That Affect the Level of Achievement of Employability 4.0 of Special Education Students with impaired Hearing in the Malaysian Polytechnics

By and large, the lecturers emphasise the students' attitude towards the use of digital technology as the foremost factor that will affect the level of achievement of employability 4.0. Concurring with the findings, Raja (2016), states that awareness about the benefits of using digital technology should be stepped up among special education students with impaired hearing, which will empower them to obtain information easily and solve many problems. According to Vlachou & Papananou (2018), there is tremendous potential for success when special education students with impaired hearing embrace digital technology at the tertiary level; the authors emphasise the emotional well-being factor that can determine the success of students in obtaining a job.

The construct of digital technology facilities needed by special education students with impaired hearing records high mean and SP values among the lecturers. However, lectures found that the internet facility and internet access to the student is moderate level. Not all students are aware that they get free internet access provided at Malaysian polytechnic. Mamat (2017) stated that lack of internet facilities including speed and limited accessibility range Wi-Fi that only can be accessed in class or lab causes lectures not to be implemented, negatively affecting students' learning experience, Andai (2019) also stated that many polytechnic student complaints they are not satisfied with the Wi-Fi facility in terms of accessibility and slow internet speed. Thus, polytechnic management needs to take action by having a discussion with the Technology and Multimedia Unit to improve the internet network for the benefit of all parties. Osman & Diah (2017) also state the need to increase internet access for students with impaired hearing so that they can acquire essential digital skills and compete in the labour market.

The quality of teaching and digital learning of lecturers for special education students with impaired hearing registers a high average mean value and SD among lectures perspective. Based on all items, it showed that students were not fully exposed to a demonstration through a digital simulation approach in their class. This demonstration method should be encouraged by all lectures, especially in TVET and special education programs. This method can attract students' attention and curiosity because they gain knowledge based on what they saw (Muthusamy, 2016). Besides, Rahman et al. (2021) report that teaching and learning associated with IR4.0 are spreading and they entail the use of digital technology such as e-learning platforms and YouTube. These are the main avenues of knowledge and skills acquisition for all students, including special education students with impaired hearing. Virtually, all educational institutions resorted to online communication and social media networks as the primary tools for conducting teaching and learning during the outbreak of the Covid-19 pandemic (Rahman et al., 2021). Another item in this construct gains moderate mean and SD is the syllabus prepared to Special Skills Certificate does not align with employers' demands.

The syllabus for Special Skills Certificate must be followed and aligned with employers' demands to prepare students for lifelong learning and preparation for entering the workforce (Adigun & Nzima, 2021). Grant & Basve (2014) also state that the use of digital technology in education plays a very important role in formulating curriculum development that has given special education students equal opportunities for learning, and helps prepare them for lifelong learning, carrying out everyday activities, and get ready to enter the workforce.

The construct of the attitude of special education students with impaired hearing towards the use of digital technology scores a high average value. However, it is found that lectures show a moderate level of student effectiveness while performing a task when using digital technology. The negative attitude that has plagued students is because they are not ambitious about the technology they used while performing a task given by lectures, affecting their performance in learning. A study by Chelkowski, Yan & Saddler (2019) that the use of computers and smartphones that have assistive technology can increase the enjoyment of special education students with impaired hearing during the learning process; the usage of digital devices increases the students' productivity and improves their skills in handling different applications. Soetan et al. (2021) also state that a positive attitude will spur special education students with impaired hearing to use digital technology more effectively.

4.3.2 Differences in Factors that Affect the Level of Achievement of Employability 4.0 of Special Education Students with Impaired Hearing from The Perspective of Lecturers Based on Gender, Programme Taught and Teaching Experience

Based on the findings of the study, there is no gender difference as a factor that may affect the level of achievement of employability 4.0. It is in line with a study by Batanero (2018): there is no difference between male and female lecturers' provision of computer and smartphone facilities to special education students with impaired hearing. Good teaching of digital technology by both male and female lecturers can improve the digital knowledge of special education students with impaired hearing, which will enable the students to find information and perform useful tasks.

Based on the findings of the study, there is no difference between the programmes taught as a factor that may affect the level of achievement of employability 4.0. It is similar to a study by Almenara et al. (2020), which states that every programme in the field of study should use new digital technologies in teaching and learning so that special education students can understand and master new digital skills. Lecturers must be aware that the use of new technologies for each programme can bridge the gap of digital skills. Therefore, every Special Skills Certificate programme in Malaysian polytechnics should be conducted with the use of computers and smartphones so that they can attain employability 4.0.

From the findings, there is a significant difference between the lecturers' teaching experience as a factor that may affect the level of achievement of employability 4.0 of special education students with impaired hearing. This is consistent with the findings of Ngubane & Khoza (2016), which state that digital technology facilities used by lecturers can influence the effectiveness of learning and teaching quality. As supported by Perumal, Rahman and Surat (2021), a student's positive attitudes are shaped by their lecturers' who have experience in teaching; therefore, students should be encouraged to further explore the content of the subject's using software and digital technology applications.

4.3.3 Employers' Perspective on the Factors that Affect the Level of Achievement of Employability 4.0 of Special Education Students with Impaired Hearing in Malaysian Polytechnics

Based on the findings of this study, digital technology facilities needed by special education students with impaired hearing are highly sought after by employers. It is consistent with the findings Li et al. (2020), which state that rapidly developing digital technology facilities in various fields of work must be easily accessible to all people, including disabled workers; digital knowledge and skills are the keys to new job opportunities.

The construct of digital technology facilities needed by special education students with impaired hearing scores high mean and SD values among employers. This shows that employers do provide computer and smartphone facilities to disabled employees at their workplaces. However, employers do not allow students to use a smartphone during working hours because they assumed that it will serve as a distraction rather than an effective communicative tool among their peers. Benedikt et al. (2019) found that disabled workers who are proficient in assistive technology apps will be able to work in smart factories. Besides, it is in compliance with the 2008 Disability Act, Part IV of Chapter 1, which defines Accessibility: access to information, communication and technology. It is the responsibility of the Malaysian government and the private sector to provide disabled people with the right to access information, communication and technology (Disabled Persons Act, 2008).

The construct of industrial training in an environment conducive to working for special education students with impaired hearing records a high mean value among employers. The analysed item shows that student does not ensure their workspace is always clean and they keep working in a noisy workplace. A clean work environment ensures that employees can live prosperous life at work (Sani, 2014). This agrees with a study by Alias (2019), which states that industrial training programmes offer good opportunities for students to participate in a real work environment. The work experience gained through industrial training has many advantages: trainees will have a better chance of securing a job; and they are more confident as well as more prepared to enter the workforce (Lindstrom et al., 2011). Thus, the

experience acquired by the students during industrial training can improve their work performance as they have been exposed to a real work environment.

The constructive attitude of special education students with impaired hearing towards the use of digital technology records high mean and SD values among employers. However, the employer's perspective showed that students can perform a task that involves the use of digital technology given by employers timely get moderate mean and SD values. The findings showed that student takes a long time to complete a task given by their employers because they lack knowledge about digital technology software and apps. The study by Davidescu et al. (2020) says that a comfortable workplace can provide job satisfaction to disabled employees with impaired hearing. In addition, it can also increase the employees' work performance and improve the image of the organisation. Padkapayeva et al. (2017) observe that with the use of computers, smartphones and the internet, a hearing-impaired employee can perform tasks successfully and even improve the efficiency of the work processes. Besides, Osman & Diah (2017) believe that the acquisition of digital skills is one way for hearing-impaired students to get a good job. Indirectly, they are participating in the economic development of the country, and contribute positively to society as well as providing motivation for other students to master digital skills.

5. Conclusion

Overall, after analysing the factors that affect the level of achievement of employability 4.0 of special education students with impaired hearing, it is noted that some items related to the sample of lecturers score a moderate mean value. Based on the mean value of the factors that affect the level of employability 4.0 of special education students with impaired hearing, it is found that the lecturers emphasise the students' attitude towards the use of digital technology; meanwhile, the employers stress the need for digital technology facilities.

In addition, based on the mean values of IR4.0 technology facility requirements, the lecturers mention the importance of cloud computing technology, while the employers emphasise the availability and use of Wi-Fi at the workplace. Both the lecturers and employers realise that it is essential to impart knowledge and skills of IR4.0 technologies to special education students with the impaired hearing today so that they can achieve the standard of employability 4.0. Therefore, the factors affecting the employability 4.0 of special education students with impaired hearing in Malaysian polytechnics should be considered seriously so that graduates produced can satisfy the employers' requirements; at the same time, these competent workers with digital skills would be an asset in a developing country like Malaysia. Hence, it is recommended that another researcher implement other factors affecting the employability 4.0 of special education students with impaired hearing in Malaysian polytechnics that have been analysed besides this study to maintain their employability 4.0 aligned with employers' needs. Besides, the last recommendation for another researcher is to implement this study in a qualitative method to gain a better perspective of lecturers and employers.

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References

Abdallah A. A., Woolsey, L. M. & Kharbat, F. F. (2021) Using online information technology for deaf students during COVID-19: A closer look from experience. *Heliyon*, 7(2021), 1-12.

Abdul Razak, A. N., Noordin, M. K., & Abdul Khanan, M. F. (2022). Digital Learning in Technical and Vocational Education and Training (TVET) In Public University, Malaysia. *J. of Technical Education and Training*, 14(3), 49-59.

Abdullah, 'A. Q., Humaidi, N. & Shahrom, M. (2020) Industry revolution 4.0: the readiness of graduates of higher education institutions for fulfilling job demands. *Romanian Journal of Information Technology and Automatic Control*, 30(2), 15-26.

Adigun, T. O. & Nzima, R. D. (2021) The fourth industrial revolution and persons with disabilities: peeping into the future through the lens of the present. *Multicultural Education, 7*(7), 113-119.

Alias, A. (2019) Internship in the Transition Program from School to Work. *GJAT, 7*(special issue), 7-13.

Alias, A., Sharif, M. N., Baharuddin, N. F., Hamzah, M. H. M. & Zahari, F. (2016) Penerokaan Kesan Pengajaran Dan Pembelajaran Menggunakan Visual Imej Dalam Kalangan Pelajar Cacat Pendengaran [Exploring the Effects of Teaching and Learning Using Visual Images Among Hearing Impaired Students]. *Jurnal Komunikasi Malaysian Journal of Communication*, *32*(1), 335-350.

Aliu, J., Aigbayboa, C. & Oke, A. (2021) Examining undergraduate courses relevant to the built environment in the 4IR era: a Delphi study approach. *Emerging Res. in Sustainable Energy & Buildings for a Low-Carbon Future, 5*, 195-215.

Almenara, C. J., Gamez, D. G. F., Palmero, R. J. & Rodriguez, P. A. (2021) Teachers' digital competence to assist students with functional diversity: Identification of factors through logistic regression methods. *British Journal of Educational Technology*, *53*(1), 41-57.

Amiron, E., Latib, A. A, & Subari, K. (2019) Industry Revolution 4.0 Skills and Enablers in Technical and Vocational Education and Training Curriculum. *International J. of Recent Technology and Engineering (IJRTE)*, *8* (1C2), 484-490.

Anas M. O. & Mukhtar O. S., (2016) The impact of using instructional computerized software on academic achievement among deaf and mute students in elementary schools of Jarash - Jordan. *International Journal of Current Research*, 8 (08), 36552-36560.

Andai, M. N. (2019) Penggunaan Internet Tanpa Wayar (Wi-Fi) Di Politeknik: Satutinjauan Pelajar Mengenai Persepsi Pelajar Dalammenggunakan Kemudahan Internet Tanpa Wayar [Use of Wireless Internet (Wi-Fi) In Polytechnic: A Survey of Students on The Perception of Students in Using Wireless Internet Facilities]. *e-Proceedings of the National Technology Research in Engineering, Design and Social Science (nTrends'19)* (pp. 94-101). Politeknik Melaka, Melaka.

Andreasson, K. J. (2015). *Digital divides: the new challenges and opportunities of e-inclusion*. (1st edn). Boca Raton: FL CRC Press.

Aulbur, W., Arvind, C.J & Rishi Bigghe. (2016). *Skill Development for Industry 4.0*. Retrieved from https://www.globalskillsummit.com/whitepaper-summary.pdf

Baglama, B., Haksiz, M., & Uzunboylu, H. (2018). Technologies used in education of hearing-impaired individuals. *International Journal of Emerging Technologies in Learning (iJET)*, 13(09), 53-63.

Bakar, A. Y. (2016) '"Digital classroom": an innovative teaching and learning technique for gifted learners using ICT. *Creative Education*, 7, 55-61.

Batanero, M. F. J., Cabero, J. & Lopez, E. (2018) Knowledge and degree of training of primary education teachers in relation to ICT taught to students with disabilities. *British Journal of Educational Technology*, 50(4), 1961-1978.

Benedikt G. Mark, Sarah H., Erwin R. & Dominik T. M. (2019) Inclusion of workers with disabilities in production 4.0: legal foundations in europe and potentials through worker assistance systems. *Sustainability 2019*, *11*(21), 1-21.

Chelkowski, L., Yan, Z. & Saddler, A. K. (2019) The use of mobile devices with students with disabilities: a literature review. *Preventing School Failure*, *63*(3), 1-12.

Chua Yan Piaw (2014). *Kaedah Penyelidikan* [Research Methods]. (3rd edn). Malaysia: McGraw Hill Education Sdn Bhd.

Davidescu, A. A., Apostu A. S., Paul A. & Casuneanu, J. (2020) Work flexibility, job satisfaction, and job performance among Romanian employees—implications for sustainable human resource management. *Sustainability*, 12(15), 1-53.

Economy Planning Unit (2021), Twelfth Malaysia Plan, 2021-2025 Document,2021- 2025. Retrieved from https://rmke12.epu.gov.my/en/documents/twelfth-plan.

Effah, B., Boampong, E., Adu, G., Anokye, R., & Asamoah, J. N. (2014), Issues of the Industrial Training Programme of Polytechnics in Ghana: The Case of Kumasi Polytechnic. *Journal of Education and Practice*, *5*(5), 39-46.

Etikan, I., Musa A. S. & Alkassim, S. R. (2015) Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics, 5*(6), 1-4.

Grant, P. & Basve, D. (2014) *Personalized learning: A guide for engaging students with technology*. (1st edn). USA: International Society for technology in education.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2013). Editorial-partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long Range Planning*, *46*(1), 1-12.

Halim, F. (2013) *Kemahiran Kebolehgajian, Estim Kendiri & Efikasi Kendiri Pelajar Teknikal & Vokasional Yang Bermasalah Pendengaran Di Politeknik & Kolej Komuniti, Malaysia* [Employability Skills, Self-Esteem & Self-Efficacy of Hearing Impaired Technical & Vocational Students in Polytechnics & Community Colleges, Malaysia]. (Unpublished PhD thesis). Universiti Putra Malaysia.

Hamid, H. (2012) *Aspirasi Kerjaya Dalam Kalangan Pelajar Bermasalah Pendengaran Di Politeknik* [Career Aspiration Among Hearing Impaired Students in Polytechnic]. (Unpublished master thesis). Universiti Tun Hussein Onn Malaysia, Batu Pahat.

Kadir, A. N., Masri, S. & Salleh, S. (2020). Pembangunan prototaip aplikasi mudah alih telefon pintar bagi pelajar berkeperluan khas rekabentuk fesyen dan pakaian di Politeknik Ibrahim Sultan [Development of a prototype of a

smartphone mobile application for students with special needs in fashion and clothing design at the Ibrahim Sultan Polytechnic.]. *International Creative and Innovative Products Exhibition 2020 (ICrIPE 2020),22,* 119-124.

Khairi, S., Redzuan, I. N. & Hashim, N. (2017). Persepsi majikan terhadap pelajar OKU pendengaran di Politeknik Sultan Salahuddin Abdul Aziz Shah yang menjalani latihan industri [Employers' perception of hearing-impaired students at Sultan Salahuddin Abdul Aziz Shah Polytechnic who undergo industrial training]. *SEAMEO SEN ICSE 2017*(pp. 291-299). Borneo Convention Centre Kuching (BCCK).

Khalik, A. & Said, M. F. (2021). Online teaching and learning for Malaysia polytechnic hearing-impaired students: A case study. *International Conference of Research on Language Education* (I-RoLE) 2021. UiTM Melaka.

Li, B., Fisher R. K., Farran, Q. F. & Cheng, Z. (2020) Digital policy to disability employment? An ecosystem perspective on China and Australia. *Social Policy & Administration, 55*(5), 863-878.

Lindstrom, L., Doren, B., & Miesch, J. (2011) Waging a living: Career development and long-term employment outcomes for young adults with disabilities. *Exceptional Children, 77*(4), 423-434.

Ling, Y. M., Hamid, A. & Chuan, T. C. (2020) Is Malaysia Ready for Industry 4.0? Issues and Challenges in Manufacturing Industry. *International Journal of Integrated Engineering,12* (7),134-150.

Magrin, E. M., Marini, E. & Nicolotti, M. (2019) Employability of Disabled Graduates: Resources for a Sustainable Employment. *Sustainability, 11*(1542), 1-17.

Makhbul, Z., Hasun, M. F. & Latiff N. M., (2018) Pengurusan sumber manusia hijau mendepani industri 4.0 [human resource management for green industry 4.0]. *Proceeding of the 5th International Conference on Management and Muamalah 2018 (ICoMM 2018)* (pp. 159-172). Tenera Hotel, Bangi.

Malaysia Investment Development Agency (MIDA). (2017). *Laporan Prestasi Pelaburan Malaysia 2017* [Malaysia Investment Performance Report 2017].

Malaysia. (2008). Disabled Persons Act (PwD) 2008. Act 685 of 2008.

Mamat, A. B. (2017). Perlaksanaan E-Pembelajaran Dalam Proses Pengajaran dan Pembelajaran Pensyarah Di Politeknik Hulu Terengganu [Implementation of E-Learning in the Teaching and Learning Process of Lecturers at Hulu Terengganu Polytechnic]. *e- Proceeding National Innovation and Invention Competition Through Exhibition 2017* (pp. 75-87). Politeknik Sultan Abdul Halim Mu'adzam Shah, Kedah.

Matt, D.T.& Rauch, E (2013) Design of a network of scalable modular manufacturing systems to support geographically distributed production of mass customized goods. *Procedia CIRP 2013, 12*, 438-443.

Megat Ayop Megat Arifin, and Abd. Halim Ahmad, (2016) Kepentingan budaya integriti dan etika kerja dalam organisasi di Malaysia: suatu tinjauan umum [The importance of integrity culture and work ethics in organizations in Malaysia: a general survey]. *Geografia: Malaysian Journal of Society and Space*,*12* (9). 138-149.

Meresman, S. & Ullmann, H. (2020). COVID-19 y las personas con discapacidad en América Latina: mitigar elimpacto y proteger derechos para asegurar la inclusión hoy y mañana (COVID-19 and people with disabilities in Latin America: mitigate the impact and protect rights to ensure inclusion today and tomorrow). Retrieved from https://repositorio.cepal.org/bitstream/handle/11362/45492/S2000299_en.pdf?sequence=1&isAllowed=y

Mohamed, J. (2006). *Pendidikan Khas Untuk Kanak - Kanak Istimewa* [Special Education for Special Children]. Selangor Darul Ehsan: PTS Professional Publishing Sdn. Bhd.

Mustafa, T. L. & Qistin, N. (201) Faktor-faktor yang mempengaruhi keberkesanan pendidikan khas teknik dan vokasional untuk golongan orang kurang upaya di tiga buah politeknik [Factors affecting the effectiveness of special technical and vocational education for the disabled in three polytechnics]. *Unpublished*, 1-12.

Muthusamy, J. a/p. (2019). Keberkesanan Kaedah Demonstrasi Video dalam Pengajaran dan Pembelajaran bagi Modul Pendawaian Elektrik Tiga Fasa [Effectiveness of Video Demonstration Method in Teaching and Learning for Three-Phase Electrical Wiring Module]. *Journal of ICT in Education, 3*, 35-54.

Ngubane-Mokiwa & S. A.; Khoza, S. B. (2016) Lecturers' Experiences of Teaching STEM to Students with Disabilities', *Journal of Learning for Development, 3*(1), 37-50.

Nichole K. Z. (2019) *Technology use by teachers of deaf and hard-of-hearing students*. (Unpublished PhD thesis). West Virginia University, USA.

Olugu, F. (2020) Availability and utilization of assistive technology devices for improved teaching and learning among students with learning disabilities in Ohafia. *Abia State. SSRN Electronic Journal*, 1(1), 1-38.

Osman, M.O. & Diah, M.N. (2017) Empowering people with disabilities (PWDs) via information communication technology (ict): the case of Malaysia. *International Journal for Studies on Children, Women, Elderly and Disabled*, *2*(6), 86-93.

Padkapayeva, K., Posen, A., Yazdani, A., Buettgen, A. Mahood, Q & Tompa, E. (2017) Workplace accommodations for persons with physical disabilities: evidence synthesis of the peer-reviewed literature. *Disability and Rehabilitation*, *39*(21), 1-17.

Paul, F.. (2021). *What do graduates do?* Retrieved from https://www.york.ac.uk/media/studenthome/workandvolunteering/otherpdfsanddocs/what-do-graduates-do 202021.pdf

Perumal, J., Saemah, R. & Shahlan, S. (2021) Hubungan pendedahan teknologi dengan sikap pelajar [The relationship between technology exposure and student attitudes]. *Jurnal Dunia Pendidikan*, 3(3), 83-91.

Pujiwati, A., Hutagaol. P. M., Pasaribu, B., & Pandiaitan, N. (2021) Development of employability model 4.0 higher education graduates in Indonesia. *Indian Journal of Economics and Business*, 20(2), 389-397.

Rahman, A. A., Nozlan, N. N., Thaidi, A. A. H. & Rahman, A. F. (2021) Pandemik COVID-19: Isu penggunaan ICT dalam proses pengajaran dan pembelajaran (pdp) bagi pelajar orang kurang upaya (OKU) di institusi pendidikan khas di Malaysia [The COVID-19 pandemic: The issue of using ICT in the teaching and learning process (pdp) for students with disabilities (SwD) in special education institutions in Malaysia]. *'Ulūm Islāmiyyah Journal*, *33*(S4), 271-288.

Raja, S.D. (2016). *Bridging the disability divide through digital technologies.* Retrieved from https://pubdocs.worldbank.org/en/123481461249337484/WDR16-BP-Bridging-the-Disability-Divide-through-Digital-Technology-RAJA.pdf

Rosli, F. H., Ahmad, H. M., Takril, F. N. & Sabri, A. S. (2017) Penyediaan fasiliti orang kurang upaya (OKU) di institusi pengajian tinggi di Lembah Klang: satu kajian kes [Provision of facilities for persons with disabilities (PwD) in higher education institutions in the Klang Valley: a case study]. *Proceeding - 2nd Putrajaya International Conference on Children, Women, Elderly and Disabled People (PICCWED2)* (pp. 304-311). Hotel Bangi-Putrajaya.

Rozelia Haizah Abd Razak & Nur Farahkhanna Mohd Rusli. (2022) Pembelajaran secara dalam talian: tahap kesediaan dan keberkesanan pelaksanaannya kepada pelajar [Online learning: the level of readiness and effectiveness of its implementation for students]. *LSP International Journal*, *9* (1), 31-43.

Sahar Afshana & Arshian Shari. (2016) Acceptance of mobile banking framework in Pakistan. *Telematics and Informatics*, *33*(2016), 370-387.

Samian, S., Ali, M. K. & Buntat, Y. (2013) Persepsi majikan terhadap pekerja orang kurang upaya (OKU) dalam organisasi di negeri Johor [Employers' perception of people with disabilities (PwD) worker in organizations in the state of Johor]. *2nd International Seminar on Quality and Affordable Education (ISQAE 2013)*. KSL Hotel & Resort, Johor, 349-353.

Sani, M. R. (2014) *Hubungan di antara amalan pengurusan keselamatan dan tingkahlaku keselamatan: suatu kajian di Petronas Fertilizer Sdn Bhd* [The relationship between safety management practices and safety behaviour: a study at Petronas Fertilizer Sdn Bhd]. (Unpublished master thesis). Universiti Utara Malaysia, Malaysia.

Shapri, M. A. (2019) *Hubungan antara kemudahgunaan, kebergunaan dan keseronokan dengan sikap terhadap realiti berperanta (AR) dalam kalangan murid bagi subjek Bahasa Inggeris* [The relationship between ease of use, usefulness and enjoyment with attitudes towards augmented reality (AR) among students for English subjects]. (Unpublished master thesis). Universiti Pendidikan Sultan Idris.

Soetan, K. A., Onojah, O. A., Alaka, B. T. & Onojah, A. A. (2021) Attitude of hearing-impaired students towards assistive technology utilization in Oyo State adopting the survey method. *Indonesian Journal of Community and Special Needs Education*, *1*(2),103-118.

Talib, A. R., Sunar, M. S. & Mohamed, R. (2019) Digital society and economy for people with disabilities in Industry 4.0: Malaysia perspectives, *EAI Endorsed Transactions on Creative Technologies*, *6*(20), 1-9.

Tasir, Z., Harun, J. & Yen, S. L., (2006) Faktor penggunaan komputer dan kaitannya dengan kesediaan mengikuti pembelajaran dalam talian di kalangan pelajar sarjana [Factors for computer usage and its relation with readiness to join online learning]. *Jurnal Teknologi*, *44*(E), 75-91.

Tohara, T. T., Shuhidan, M., Bahry, S. F. & Nordin, M. N. (2021) Exploring Digital Literacy Strategies for Students with Special Educational Needs in the Digital Age. *Turkish Journal of Computer and Mathematics Education*, *12*(9), 3345-3358.

Vlachou, A.; Papananou, I. (2018) Experiences and perspectives of greek higher education students with disabilities. *Educ. Res*, 60(2), 206-221.

Wymann, B. & Schellinger J. (2021) Employability 4.0: Employability in a changing world of work. *Employability 4.0*, 183-216.

Yahaya, H. N. & Latiff, A. Z. (2021) Acceptance on open and distance learning method amongst special education needs teachers during movement control order. *Journal of Media and Information Warfare (JMIW), 14* (1) ,68-79.

Yahya, N. & Helen, H. (2017) Impak e-com deaf Bagi Kursus SBK1021 Dalam Kalangan Pelajar Khas Politeknik Kota Kinabalu [Impact of e-com deaf for the SBK1021 Course Among Special Students of Kota Kinabalu Polytechnic*]. International Journal of Research in Engineering and Science (IJRES), 5*(2), 1-6.

Yusof, M. & Mohiddin, H. (2018) Refleksi pelajar terhadap keberkesanan kursus latihan industri: kajian kes pelajar Politeknik Muadzam Shah [Students' reflections on the effectiveness of industrial training courses: a case study of Muadzam Shah Polytechnic students]. *Malaysian Online Journal of Education*, *2*(2), 46-54.

Yusof, M. F., Zainul. A., & Awang, H., (2013) Improving Graduates' Employability Skills Through Industrial Training: Suggestions from Employers. *J. Educ. Pract.*, *4*(4), 23-29.

Zainuna, Z., Razallib, A. R., Kamisc, K. & Hock, K. E. (2020) Implementation of Industrial Training for Students with a Disability: The Role of Adaptability in Enhancing Their Workplace Well-Being, *International Journal of Innovation, Creativity and Change*, *12*(7), 221-235.