

VIRTUAL EDUCATION: ICT READINESS OF TEACHERS FROM SECONDARY SCHOOL IN PENAMPANG, SABAH DURING COVID-19 PANDEMIC

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ABSTRACT

COVID – 19 pandemic occurred since 2019 and gives a strong impact to most of the educational institutions world widely to shift their teaching and learning process from traditional physical mode to virtual education so that the education continues uninterrupted. A minority of teachers did not see this paradigm shift as a challenge as they were already implementing virtual or blended education before the pandemic. However, there were institutions or teachers who are not ready to adapt to the shift. Therefore, it is important to investigate to what extent teachers are ready to carry out virtual education. This paper is aimed to study the readiness of teachers with virtual education during COVID – 19 pandemics. This paper applies qualitative method. A selected teacher from a secondary school from district Penampang was interviewed through prepared questionnaires. Six categories were extracted from the interview transcript which then derived to the theme blended learning. Two main challenges that teacher encountered during the implementation of virtual education are internet connectivity and smart devices accessibility. This study has implication for educational institutions that intend to promote ICT readiness among teachers in succeed virtual education.

Keywords: Connectivism, COVID – 19 Pandemic, ICT Readiness, Virtual Education.

BACKGROUND OF THE STUDY

Gen Alpha is a 21st century-born learner. According to the definition in Wikipedia, Generation Alpha (Gen Alpha for short) is the demographic cohort succeeding Generation Z. Generation Alpha is the first to be born entirely in the 21st century and most of them are the children of millennials. By 2020, this new generation cohort that steps into the business world are called Digital Native learners. These students are born on the internet – connected world and ICT is part of their routine according to Desai & Lele (2017). Therefore, Diane and Catherine (2011)

said that helping teachers to understand how to use new pedagogies, especially virtually is important. They also emphasized successful professional development required attention to multiple factors including teacher ability in using software.

According to World Health Organization (WHO), coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus. Wuhan Municipal Health Commission, China, reported a cluster of cases of pneumonia in Wuhan, Hubei Province, hence a novel coronavirus was identified. Lockdowns and social distancing restrictions due to COVID – 19 pandemics have forced educational institutions to shift their emphasis from traditional face – to – face learning modes to online learning environments. Research article of Watermeyer et al. (2020) stated that the sudden shift to online learning mode resulted in enhanced IT demands that may not necessarily be coped well by all the learners. Research article of Shirish, Chandra and Srivastava (2021), COVID – 19 impacted social distancing measures forced an abrupt switch to online education in most universities, putting immense pressure on the students to creatively adapt to new ways of online education. They also mentioned that online environments facilitate improved student learning by offering IT tools to enhance student productivity and creativity in learning. Despite the purported positives of online education, in the COVID – 19 scenarios, students reported mixed outcomes where some students could adapt to the 'new normal', others struggled to adjust to the transformed IT – enabled learning scenario.

The digital era encourages the use of Information Technology (IT) in the education institutions. IT facilitates virtual education as e-learning concept. IT allows both teachers and students to engage readily in the virtual platform, from each own location. Junus et al. (2021) reported that one of the well – known online platforms for the engagement between the teachers and students is Learning Management System (LMS). According to Junus et al. (2021), LMS is a platform that mediates learning processes by enabling course material repositories, student activity trackers, assignment submission, as well as review and discussion among participants. Online classes are the growing trend in digital transformation in almost all the education institutions from pre – schools to universities since the outbreaks of COVID – 19 pandemics far in the year of 2019, increases the introduction to internet as young as 4 years old kids in education institutions. According to Favale et al., (2020), the Internet plays an important role in supporting online learning and online collaboration. Panigrahi et al. (2018) agreed that online learning and training make full use of the advantages brought by the innovation of Internet technology, breaking through the constraints of time and space, constructing a new learning model which differs from face – to – face learning. Moreover, Ganesh et al. (2015) also agreed when students study via online learning platform used as a virtual classroom, they can interact with teachers freely.

Maria and Pawel (2020) said that COVID – 19 lockout situation affected people all over the world. Despite all the disadvantages, this situation offered new experiences and perspectives and pushed education advances forward as never before. Something that seemed to be unreal became a worldwide reality within a few days. Instructors of all subjects at all educational levels moved to a virtual environment instantly. Higher education institutions, universities, and colleges seemed to be prepared for this situation. Unfortunately, primary and

secondary schools, especially in eastern and central Europe, never considered distance education as a valuable alternative before, so they did not have software, hardware, and staff prepared for such a situation. Virtual education implementation required a radical change by the teachers and students regarding their mode of communication, assessments, and content delivery.

PROBLEM STATEMENT

With almost the entire world in a quarantine previously due to the global pandemic, all the educational institutes have been affected. The recent COVID – 19 pandemic has caused a paradigm shift in the way teachers deliver quality education through various online platforms used in schools (Bawa'aneh, 2021). Virtual platforms use various pedagogical approaches to tackle new market conditions and help the teachers and students to adapt to the changing situations. In the research paper of Dahiya and Malik (2021) mentioned that the virtual platforms provide a lot of flexibility, affordability, and accessibility. However, according to the research paper of Reyes – Chua et al. (2020), there are plenty reviews on the fundamental problem of online classes where not many teachers are ready and have enough experience to conduct lessons virtually. Moreno – Guerrero et al. (2020) stated that virtual education was expected to positively impact autonomy, motivation, and student participation. Majority of Malaysian teachers are not equipped with foundation of computer literacy, therefore difficult to build new technological skills. To implement online education successfully, the understanding of teachers' readiness needs to be ensured. This proposed study aims to evaluate the readiness of teachers in virtual education during COVID – 19 pandemic, the weaknesses, and obstacles that teachers must overcome so that the online class can be conducted more successfully.

PURPOSE OF STUDY

This study attempts to investigate the teachers' ICT readiness levels to conduct virtual lessons during pandemic. This proposed study is guided by the research questions: What are the teachers' ICT readiness levels to conduct virtual lessons during pandemic?

SIGNIFICANCE OF THE STUDY

Virtual education is a learning innovation in the 21st century as it utilizes communication, multimedia, knowledge transfer without limited space and time. The application of virtual education is very supportive of learning process activities. Online education using the Learning Management System (LMS) improves the quality of teaching by managing the content of lessons provided to students. The application of LMS enhances the learning ability and quality of students as more interactive materials can be included allowing unlimited access from students according to their availability after an official school schedule. Teachers mentally and skillfully ready to carry out online classes play an important role in succeeding the online learning system. This is because the

quality of the teaching contents and the creative interaction will improve and enhance students' motivation.

LITERATURE REVIEW

VIRTUAL EDUCATION

Virtual education or online learning is a new norm of learning mode. E – learning system, virtual learning environment (VLE) is rapidly developed and become an integral part of teaching and learning process. VLE is a design space for teaching and learning, neither replacing classrooms nor existing educational practices, yet enhance both. VLE is now well established in educational institutions as a means to structure, manage and deliver learning activities and content. VLE is recognized as having strengths in students tracking and managing online assessments. VLE presents several opportunities to educational institutions and enhance physical lessons too. Based on Martins and Kellermanns (2004), a VLE is a web – based communications platform, that allows students, without limitation of time and place, to access different learning tools, such as program information, course content, teacher assistance, discussion boards, document sharing systems, and learning resources.

Deepika (2020) mentions that online education and classes are increasingly becoming part of the education system worldwide, where online channels have made education convenient and easily accessible by one and all. She also mentioned that COVID – 19 has brought out a drastic change in the educational system not only in India but rather the entire world. According to Deepika (2020), educational institutions and management who would be the future deliverers of online learning need more understanding of how students as well as teachers perceive and react to online classes as a learning mode to apply these approaches most effectively. She mentioned teacher's perspective is equally important because if they as provider of education are not satisfied and find the online mode unsatisfactory then the educational base itself becomes weaker. This new introduction of online classes has been equally challenging for teachers, who are also struggling to learn this new way or methodology of teaching. Jon – Chao Hong et al. (2021) claimed that online education has been adopted in all stages of education due to COVID – 19 pandemics. This sudden change from traditional learning to 100% online learning may affect students' learning effectiveness, especially in experimental courses. However, scholars have pointed out that experimental courses which involve practical learning have often been implemented in face – to – face classrooms or laboratories, whereas most online courses lack hands – on activities requiring experimental operations. Favale et al. (2020) agreed that the Internet plays an important role in supporting remote work, online learning, online collaboration, and so on. Panigrahi et al. (2018) reported that online learning and training make full use of the advantages brought by the innovation of Internet technology, breaking through the constraints of time and space, and constructing a new learning model which differs from face – to – face learning. Ganesh et. al (2015) mentioned in their article when students study via an online learning platform used as a virtual classroom, they can interact with teachers freely. Broadbent & Poon (2015)

mentioned that online education is the most relevant trend of the last decades since Internet access became widely available.

Greenland and Moore (2014) claimed that increased internet access in the past decade has led to a rapid increase in the number of students electing to undertake their higher education learning experience online, rather than in traditional face – to – face settings. Online courses have several advantages over traditional settings. Waschull (2001) mentioned that web – based learning provides flexibility and accessibility for students whose schedule or location makes it difficult to attend a physical class. Serdyukov and Hill (2013) agreed that online education promotes self – directed learning and thus online students are required to be more independent. Ku and Chang (2011) mentioned in their articles that online environment exceeds standard synchronous education where students learn at the same time and place and provides for asynchronous learning in which space and time are not barriers. They said that unlike face – to face classes, the online environment exceeds standard synchronous education where students learn at the same time and place and provides for asynchronous learning in which space and time are not barriers. However, according to Wang, Shannon and Ross (2013), the success in an online environment heavily relies on a student's ability to engage in the learning process autonomously and actively.

Technology has many positive impacts during this pandemic. Wang et al. (2008), claimed that technology is being used for academic administration and student self – service, through applications such as student's life cycle management. Barana et al. (2016) reported technology is being used for learning management systems, massive open online courses (MOOCs), integrated digital – based assessment in their research article. Deming et al. (2015) agreed that online learning and massive open online courses (MOOCs) were found to reduce the higher education costs for students. According to Vahedi et al. (2019), students were found to have a positive perception towards integrating ICT in the classroom. Ofelia et al. (2017) reported another positive impact of technology in attendance management system. Other than that, ICT is found to aid in reducing distance barriers. ICT enables streamlining academic administration, bring transparency, and speed up the academic data processing. While the benefits of ICT cannot be argued, there are increased interest in understanding the negative impact of technology on the end – users. Technostress which is defined as the negative psychological link between people and the introduction of new technologies based on Wikipedia is also "inability to cope with technologies", has been extensively studied in the literature on the organization employees, for example teachers and its impact on the job outcomes. A case study by Davies (2015) also found that first – year psychology undergraduate students experienced test anxiety, computer anxiety and technostress, during their first online MCQ assessment. Upadhyaya & Vrinda (2020) reported there is a dearth of empirical studies that have examined the prevalence technostress among the younger generation too students as technostress among students may lead to a higher burden on their higher education institutions through a decrease in productivity, dropouts, and deviation from academic work.

Other than that, there are reports from Di Pietro et al. (2020) as well as Upadhyaya and Vrinda (2020) during the pandemic have highlighted issues as such as learning loss, productivity loss, and emotional distress that often termed

as 'zoom fatigue', among students all around the world. Upadhyaya and Vrinda (2020) especially emphasis on the impacts of technostress or stress induced due to technology is extensively reported in the literature, among working professionals. Even though there has been an increased proliferation of digital devices in academia, there is a dearth of studies examining the prevalence of technostress and its impact among students too. The research article also mentioned that increased use of technology in higher education has compelled students to complete all their academic work, including assessments, using technology. Hauk et al. (2018) posited that older adults find higher difficulties in using technology compared to younger adults, specifically with techno – overloaded and techno – complexity, which require a complex number of cognitive abilities and physical condition.

ICT READINESS

The COVID – 19 pandemics has caused a rapid transition to virtual education around the globe. The adoption of e – learning systems during the pandemic is a difficult and challenging process (Alqahtani & Rajkhan, 2020), and will continue after the pandemic (Mulla et al., 2020). Virtual platforms or e – learning – teaching platforms play an important role during this time. To be successful in virtual education, teachers as learners may possess certain dispositions towards learning. Teacher readiness means that a new teacher has the skills and knowledge required for effective teaching, sufficient knowledge of the subject matter that they will be teaching and the personal characteristics and competencies that allow them to engage in the profession through effective relationship building. The use of information and communication technology (ICT) brings about a powerful learning environment and it transforms the learning and teaching process in which students deal with knowledge in an active and interactive way.

ICT is not only a tool added to the existing teaching approach of teachers, but also an important instrument to support new ways of teaching and learning process. ICT has been integrated into the teaching and learning process in various education institutions world – widely. Teacher readiness in ICT is a bigger challenge as the successful integration of ICT in teaching and learning process is highly dependent on the preparation of teachers (Singh & Chan, 2014). To meet the demands of the 21st century, people need to know how to use their knowledge and skills by thinking critically, applying knowledge to new situations, analyzing information, generating new ideas, communicating, collaborating, problem solving, and making decisions. These skills provide both flexibility and security in an era of constant change. People who can learn new information, new software programs or new ways of doing things have much better prospects in every part of the world. Ranjt Singh and Chan (2014) commented that our Malaysian students today lack the ability to think critically and analytically as well as making their own decisions. Inan and Lowther (2009) defined teachers' readiness as teachers' perceptions of their capabilities and skills needed to integrate technology into their classroom instructions. Teachers' readiness to integrate technology in classroom instructions is the most important factor that has a direct impact on technology integration. Based on the review of the

literature from Agyei and Voogt (2014), and Lau and Sim (2008), the integration of ICT in teaching among teachers may not be successful due to reasons such as the lack of knowledge, lack of skills, lack of teaching experience, lack of ICT availability, lack of training, and lack of administration support. Literature review from Buntat et al. (2010) has noted solidarity in the importance of ICT skills for the integration of ICT into the classroom of technical and vocational schools. This applies the same to all the secondary schools especially during the COVID – 19 pandemics. His literature agreed that the teachers need to be ready and keep improving their skills about ICT, and teachers should not underrate the importance and the benefit of ICT.

Suryanti et al. (2020) commented that teachers in online learning play an important role in success or failure in the online learning system. The teachers' ability to design learning content in LMS affects the quality of information presented, the interaction in learning and student satisfaction during lectures. Teachers, as the key LMS users who play a significant role in success of online learning, require them to have good readiness in providing online learning content, as well as the ability to integrate technology for e – learning success (Hashim & Tasir, 2014). According to Liaw et al. (2007), readiness in online learning is defined as how users are ready to implement their virtual learning experience in Learning Management System (LMS).

Education Blueprint 2013 – 2025 provides a comprehensive plan for a rapid and sustainable transformation of our education system to 2025. This blueprint sets out the fundamental changes from how to approach student learning, the way to recruit, train and reward the teachers and principals right through to how the Ministry of Education operated (Kementerian Pendidikan Malaysia, 2012). However, Singh and Chan (2014) revealed that Malaysian teachers' level of ICT knowledge is moderate as they were only good at using certain applications such as Microsoft words, spread sheet, presentation software, and e – mailing as these are the main applications which are commonly and often used in their teaching profession. The results obtained in journal of Singh and Chan (2014) seem like the research done by Roshaini and Mohd Arif (2010) where minority group of teachers were knowledgeable on ICT.

In society, teachers play an important role in education process, particularly in Third World countries. As agents of change, it is important that teachers are ICT literate as this could bring about a lot of positive attitudes towards the use of computers and ICT. A school usually has both hardware and software, but whether both are used efficiently, it will depend on the teachers. Kadel (2005) emphasizes the importance of teachers to be competent and have right attitude towards technology. An ICT competency describes what a teacher should know to be able to use technology in his or her professional practice. ICT competency is further defined as the confident and critical use of electronics, media for work, leisure, and communication. ICT competencies are related to logical, and critical thinking, to high -level information management skills, and to well – developed communication skills. There is a need to produce teachers who are comfortable with the adoption of technology in their lesson design (Singh & Chan, 2014) and delivery as virtual education is going to be the most important mode of knowledge delivery.

CONNECTIVISM THEORY

Educators face the challenge of integrating new technologies in the classroom today, especially in virtual education. Coronado (2018) mentioned that the 21st century educator's role is to facilitate learning, inspiring, and motivating students to see learning as a journey and encourage them to tackle new challenges. Educators also encourage their students to explore new frontiers of human endeavor, develop their skills, and develop innovate technologies that expand the world. As a modern educator, one must embrace learning as a philosophy of life, not just as a career which ends after post – secondary education. As Blake & Pope (2008) mentioned in their research paper, exposing students to real problems help reinforcing their perspective "as active, intelligent, creative constructors of their own knowledge structures".

With the internet's innate structure, new generations have increased their abilities on finding new people whom they have something in common and carrying out activities through network with them. Many studies showed that most of the social networking websites have created different learning networks and online communities on their bodies. Therefore, many education institutions have taken the advantages of social networking websites as virtual education platforms to maintain their teaching and learning activities. In this research, connectivism is proposed as an alternative platform for virtual education on social networking websites such as Instagram, Snapchat, TikTok, and YouTube. According to Tinmaz (2012), connectivism explains learning in terms of interactions on a network where the learners exchange their knowledge. Social networking websites which offer connections in the form of friendships provide a context for the implementation of connectivism. Connectivism specifically emphasizes on learning networks and their established connections among members. According to Connectivist learning theory, the learning will occur as the learners keep the tracks of their questions on their networks where they gain knowledge from different nodes and the members of learning networks (Guder, 2010). According to Siemens and Tittenberger (2009), connectivism refers to the view that "knowledge and cognition are distributed across networks of people and technology, and learning is the process of connecting, growing, and navigating those networks.

THEORETICAL FRAMEWORK

What is technology? Many of us are still asking and struggling with technology in our life, especially educators who are given a responsibility to lead and guide their students into the world of technology. Technology is known as the use of scientific knowledge for practical purposes or applications, whether in industry or in our daily lives. Technology is about the use of tools, methods or / and techniques to improve production and processes. Technology involves the purposeful application of knowledge, experience, and resources to create processes and products that meet human needs. Adoption and adaptation of technology are always varying. Some adopt with optimism and enthusiasm, while others receive forcefully and stressfully. ICT readiness of an educator highly dependent on the technology's acceptance. Davis (1989) conceptualized this phenomenon in his Technology Acceptance Model theory as shown as Figure 1,

and states that technologies acceptance rate depends entirely on two characteristics, which are perceived usefulness and perceived ease of use. In TAM, both are considered as distinct factors influencing user's attitude towards using the technology.

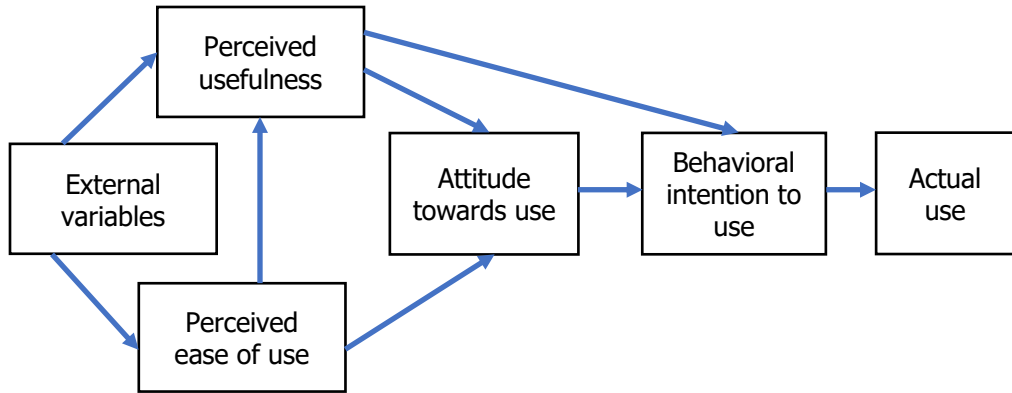


Figure 1: Original Technology Acceptance Model (Davis, 1989)

Huntington and Worrell (2013) commented that if users can easily interact with technology, and if the technology can be easily connected to real – life situation, only then are educators more likely to include this technology as part of their practice. For educators, accepting or adopting a new technology is only the first step in the journey to create an engaging and student – centered learning environment (Coronado, 2018). Based on the review in Coronado's (2018) research paper, educators must first believe that a technology will be useful and easy to use in their classroom to develop higher order thinking skills, problem – solving skills, and deeper learning among students.

CONCEPTUAL FRAMEWORK

According to Junus et al. (2021), educators' readiness to conduct virtual education is coded into six main themes of challenges – (a) internet connection and internet fee, (b) course delivery and teaching strategies, (c) time constrains, (d) monitoring, (e) evaluation, and (f) motivation. Educators with high level of ICT readiness adapt quickly in using a Learning Management System (LMS), and usually will have a tactical solution for most online classes with insufficient feasibility. Educators may have medium level of experience in conducting virtual lesson before COVID – 19 pandemic accelerate their knowledge and skill, allowing them to be better prepared when running online lessons during the pandemic.

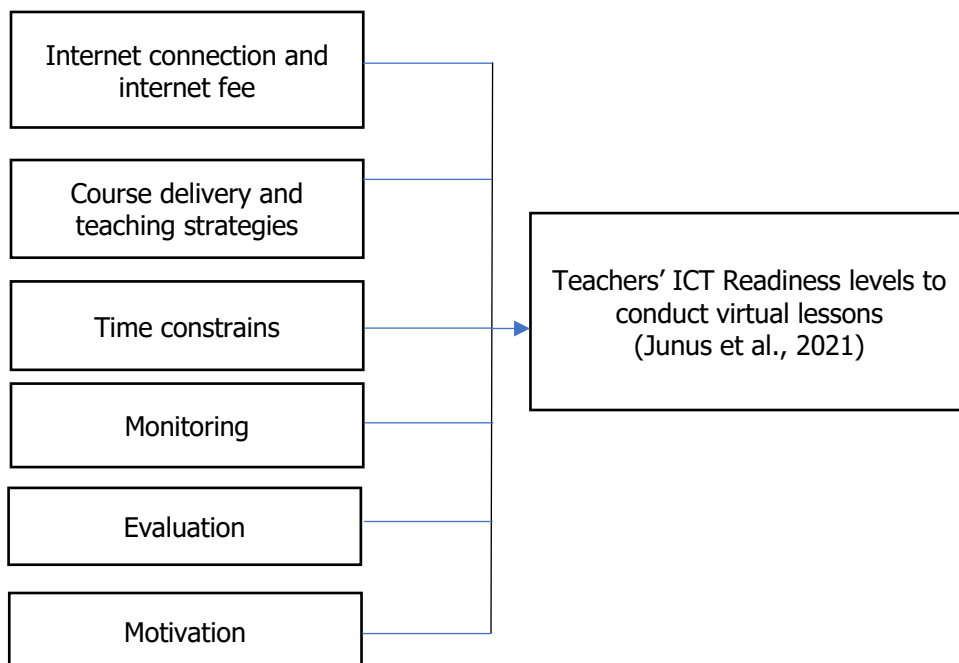


Figure 2: Conceptual framework adopted and adapted from Junus et al., 2021 to explain teacher's ICT readiness levels to conduct virtual lessons.

RESEARCH METHODOLOGY

This study is going to be carried out in three stages – (a) carry out a literature review and establish the ICT readiness of educators from secondary schools, (b) data collection from a teacher at a school in Penampang district through interview, and (c) conducting a statistical analysis of the interview transcripts and suggesting recommendations for the more efficient engagement of teachers in virtual education. This study is a qualitative research design. An interview is used to collect data from teachers regarding their ICT readiness from the six themes of challenge proposed by Junus et al. (2021). The interview is divided into six themes of challenge, besides the demographic background of respondents.

Theme Challenge 1: Internet connection and internet fee

For this theme of challenge, the respondents are asked to share their experience on internet access and the best method or application used during online class as to minimize the use of internet quota for both teachers and students.

Theme Challenge 2: Course delivery and teaching strategies

For this theme of challenge, the respondents are asked to explain Learning Management System (LMS), key factors of effective online lesson, use of technology in education that give them excitement, and the effect of virtual education on the creativity of a teacher.

Theme Challenge 3: Time constraints

In this part, the respondents are asked to share type of support offer to students and the time frame needed to prepare virtual education. Sharing is important as the time constrains in a virtual platform determine the implementation of virtual education among teachers and students.

Theme Challenge 4: Monitoring

the respondents are asked to share their experiences on monitoring the involvement of students in virtual world. The active involvement of students is one of the key indicators for a successful virtual education.

Theme Challenge 5: Evaluation

For this theme of challenge, the respondents are asked for their strategy ensuring the quality of the online class. Other than that, this theme of challenge also requires respondents to share their best mode of evaluation to access students' performance.

Theme Challenge 6: Motivation

For this theme of challenge, the respondents are asked to share their motivation or encouragement as emotional and mental engagement of students to continuously participate in the virtual classroom.

RESEARCH PARTICIPANT AND METHOD

The participant teacher who is teaching pure Science subjects (Physics, Chemistry or Biology) in government secondary schools in Sabah. A teacher was selected from a school in Penampang district. Data will be gathered using the sets of interview self – developed questions based on six themes of challenges proposed by Junus et al. (2021). The instruments consisted of six themes of challenges which are internet connection and internet fees (with two self – developed questions), course delivery and teaching strategies (with four self – developed questions), time constrains (with two self – developed questions), monitoring (with oneself – developed questions), evaluation (with two self – developed questions), and motivation (with oneself – developed questions).

DATA COLLECTION AND ANALYSIS PROCEDURE

For this study, the type of approach proposed in data collection is Grounded Theory. Grounded theory is a research methodology primarily associated with qualitative research, was first proposed by Barney Glaser and Anselm Strauss in 1967. Grounded theory is a systematic methodology that has been applied to qualitative research conducted by social scientists. Grounded theory involves the application of inductive reasoning, where the study based on grounded theory is likely to begin with a question or a collection of qualitative data. Dunne (2011) states that grounded theory demands that data collection and analysis occur concurrently, rather than in a linear sequence. Indeed, Payne (2007) remarks that "one of the unique features of grounded theory analysis is the dynamic

interplay of data collection and analysis". McGhee, Marland and Atkinson (2007) explain in their paper that grounded theory offered a way of 'challenging the status quo in social research, as contemporary studies were dominated by the testing of "grand theory" and were deductive in nature'. Dunne (2011) also mentioned in his doctoral research, which was a grounded theory study, enabled him to identify what work had been done, which issues were central the fields of study, as well as what knowledge gaps existed.

Glaser and Strauss (1967) emphasize "beyond the decisions concerning initial collection of data, further collection cannot be planned in advance of emerging theory". A specific plan for sampling cannot be clearly developed in the initial stages due to the predisposition that sampling decisions should be informed theoretically. Therefore, ongoing decisions about the direction of data collection are dependent on the emergence of themes and grounded theory. The founders of grounded theory research emphasized that data selection is a flexible and dialectic process. They emphasized that "theoretical sampling" involves data collection that is done in relation to the budding analysis. In grounded theory research, ongoing sampling adjustments are possible and expected. Glaser and Strauss (1967) also emphasized the importance of collecting data from a variety of sources as both a way to expose variation and a way to establish conceptual frameworks. Although interviews appear to be the most frequently reported, grounded theory research data have been collected through a combination of methods, including observation and documentary resources. Interviews may be lengthy at the beginning of a study but become brief, more specific, and directed toward subject matter toward the end of this study. However, the researcher may need to return to interviewees for clarification, to compare related documents or records of events associated with the initial exploration, or to contact additional individuals for further elaboration. The upcoming discussion regarding data analysis will more specifically outline ways in which researchers may decide the next steps in the discovery process.

DATA ANALYSIS

According to Egan (2002), data analysis in grounded theory research involves a constant comparative method for generating and analyzing data. There are nine steps of collection and interpretation of data – (a) coding the first set of data, (b) ongoing application of codes and potential changes in respondents, (c) comparing and revising codes, (d) checking for emerging categories, (e) forming category sets, (f) applying and modifying categories and their properties, (g) assessing the level of needed elaboration of categories and their properties, (h) detailing conceptual grounding or clarification of developed concepts, and (i) describing and clarifying the analytical rationale for research purpose.

RESULTS

The researcher used manual coding for qualitative data obtained from the interview with her interviewee. The data analysis was carried out by thematic coding, where repetitive terms are highlighted to know the relevant terminologies and important themes of interviewee's discussion. Then, based on the similarity

of the terms highlighted and the repetitions, categories were identified. The corresponding categories were then given a common theme title. The analysis results generated one theme based on six categories obtained. Figure 3 shows the results containing Theme and Categories.

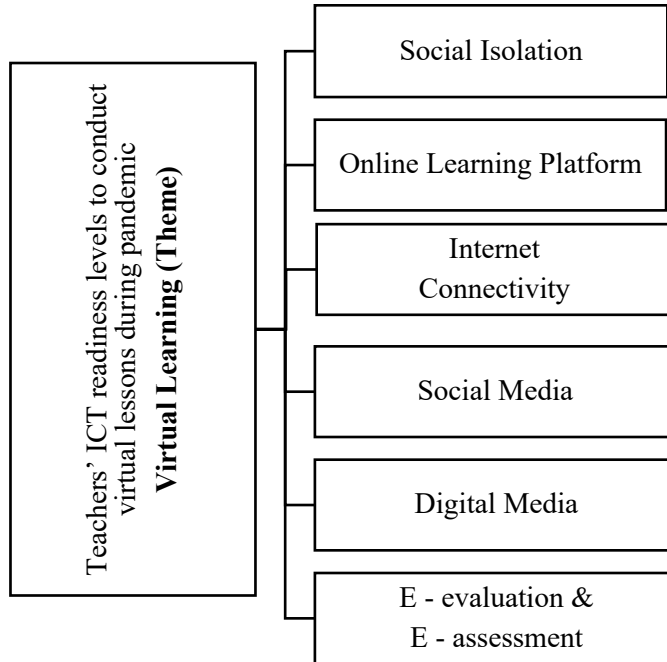


Figure 3: Themes and Categories for teachers' ICT readiness levels to conduct virtual lessons during pandemic.

In this study, interviewee reflected that teachers' ICT readiness levels are strongly affected not only by the motivation of the teachers themselves, but also affected by the willingness of their students towards online blended learning as well as facilities availability. The results obtained in Figure 3 showed that there are six categories that the researcher was able to derive after the extraction of initial codes from thirteen interview questions asked on interviewee. In this research, there was only one interviewee, whom is a head of panel Pure Science in a secondary school from Penampang district, had 15 years old teaching experiences and being through the transformation of traditional physical teaching and learning process to this virtual teaching and learning process during COVID – 19 pandemics. The First category is about social isolation. Leal Filho et al. (2021) mentioned in their article about the impacts of the Coronavirus Disease 2019 (COVID – 19) pandemic and the shutdown it triggered at the universities across the world, led to a great degree of social isolation among university staff and students, where 90% of the participants have been affected by the shutdown and unable to perform normal work or studies at their institution for between 1 week to 2 months. Interviewee expressed his experience on with social isolation as "Not really official online class like everyone do when have COVID lockdown that time juga" and "...sometimes I answered them use the voice message. Eh, I

not always do like this also, but have juga during school holiday..." Social isolation can be understood as the lack of social contacts and had few people to interact physically with regularly, even in a short duration of time. The triggered of social isolation caused by COVID – 19 pandemics contributed to the introduction of the second category, which is virtual learning platform, to be implemented more thoroughly and world – widely, especially in all education institutions in Sabah, Malaysia. Based on the understanding and experience of interviewee, virtual learning platform refers to "..... *online learning, must have Internet, WIFI, laptop, smartphone or any tablets...*", "*students can just stay at home in their room, sleep on their bed.....then follow the PDPR by teachers.*", "*....distance learning also same meaning....teaching and learning happen in anywhere....*"; "*...we find suitable place with Internet or WIFI..... give work with WhatsApp or Telegram,students no need come school...*".

The third category, internet connectivity being one of the biggest challenges to address the problem regarding learning as internet connection is both an issue and challenge not only for the students but also for teachers and the institution (R. Asio et al., 2021). Internet connectivity is the existing issue in Sabah slowing down online education in Sabah. According to Sabah Assistant Science, Technology and Innovation Minister Datuk Seri Dr Ruddy Awah in New Straits Times (February 2022) mentioned that "Sabah still needs to wait another 20 years to enjoy smooth internet access". Interviewee also commented that "*My students mostly stay in quit outskirts area.....Sometimes the internet line is not strong and not stable*". Ahmed et al. (2017) in their study also spoke of the importance of enhanced internet connectivity for e – learning especially in rural areas. Interviewee also commented that ICT readiness of teachers always affected by the readiness of their students as well as the facility provided by the educational institution, "*they have limited in internet quota and number of devices.*", "*..my students need to share devices with their siblings during the same time of the day....*", "*.....my working place here does not provide WIFI...*", "*The internet data always not stable..., sometimes students cannot hear my sound clear.....sometimes I appear to be very lag to them.*"

In addition to internet connectivity, social media and digital media are both equally important and contribute to the theme "blended learning". Digital media focuses both online and offline digital means to reach out to the students while social media is limited to online boundaries. Winslet Ting and Chi (2016) mentioned in their journal about the use of social media facilitating communication and collaboration among users to support the student – centred learning environment. Jung and Lee (2015) reported in their paper, media sharing tool like YouTube is frequently used in the education context, where students are encouraged to discuss and ask questions based on the video contents as well as to prepare and upload their videos for information sharing. Interviewee expressed his happiness as he can use YouTube videos as part of his online teaching materials, "*Luckily, I can get a lot of YouTube videos to share with students.*" Interviewee said that teachers can engage in ICT readiness even they might not have the skills to make their own teaching videos, "*I see some of my colleagues are making their own teaching video as virtual education materials. I don't know how to make video, so I search from Internet only*". Aswir et al. (2021) stated that Google Meet which is a video communication service, is one

of the online – based platform to aid online learning process continues to run smoothly during COVID – 19 pandemics. Interviewee also prepared himself with the usage of Google Meet in most of his online teaching and learning process because this is the easier and more convenient approach for him as well as his students, *"All my Google Meet lessons will be recorded too....."*, *"The link is shared to all of them through WhatsApps and Telegram...."*, *"Students who cannot join Google Meet during the online class will refer to recording lo..."*. The learning process will be pointless without any assessment as the goal of learning cannot be gauged as William (2013) stated that assessment holds a central aspect in the learning process. Haddad and Kalaani (2014) have already investigated the implementation of Google Forms as one of the virtual assessment tools. They revealed that Google Forms was an unconventional formative assessment tool that has been successful in accommodating students' feedback for the improvement of the course instruction. Interviewee agreed with the usage of Google Meet as an effective and convenient assessment tool, *"I am using Google Forms to create both formative and summative assessments. This Google Form... can use as digital assessmentallows me a lot to control how questions are presented, grade multiple choice answers automatically like that, and release grades to students through their emails. I am using Google Forms and Google Meets together to assess all my students at the same time ah. This saves plenty of my times through online educations"*.

Researcher through the interview with participant and thematic analysis on the data obtained from the interview sum up the main theme of this study as "blended learning". Blended learning (BL) can be known as hybrid learning, combining online educational materials and opportunities for e – interaction with traditional classroom methods. Dziuban et al. (2018) found small to moderate positive effect sizes in favour of blended learning when compared to fully online or traditional face – to – face environments. Many Malaysian are aware of the critical role of education as the driving force of its transformation process into becoming a knowledge – based society (Garba, Byabazaire & Busthami, 2015), teachers' readiness in ICT is the key, policy makers are considering the need and importance of full integration of information technology in the education system at all levels (Garba, Byabazaire & Busthami, 2015). However, from the data of interview obtained, teachers are not in a well prepared and readiness level also considered low, *"....really takes a lot of time to prepare..... especially PowerPoint slide. I cannot write on whiteboard like last time. I have to search Google for relevant photo and diagrams too to insert in the slide. For certain sub – topic, I will need to search for suitable video from YouTube and insert the link on the slides too (long sign). Other than that, I also have to type a lot of questions in the Google Form as basic assessment. Since this online class is something new, very sudden, and out of our controlled....., no choice also la kan"*, *"To be honest with you (long pause), there are many features in the Google Classroom, Google Meet, Telegram, I still don't know how to use them yet ah"*.

The Theory of Planned Behavior (Mohamad, Idrus & Ibrahim, 2018) can be adopted to explain the behavioral attention of teacher to use technology of ICT in virtual education. Teachers' ICT readiness in this study is based on TPB, which is equivalent to the willingness of the teachers to take action in ICT. Research shows that using computers and other digital technologies like digital

games is one way to influence young people's career aspirations and improve their digital literacy as the world of work is changing and emerging jobs become more intensive in their use of digital technologies (Dele – Ajayi et al., 2019). In classroom, teachers play an important role in integrating technology and improving the digital literacy skills of their students. However, research also showing teachers are struggling with integration of ICT in their teaching (Ertmer et al., 2012). Research shows that reluctance of teachers to use ICT in their teaching is scared of looking unprepared in front of their students, *"But ah.....I never use these two apps for my online lessons. Ah..... these applications are more complicated compared to Google Meet. Malu juga if teacher tak pandai use Webex or Zoom to share screen, share info. Later my students laugh at me..."* with the common reasons, lack of technical support (Bingimlas, 2009), *"The biggest problem for us here ah , I can say is that the Internet line..... This is because my working place here does not provide WIFI (smile speechlessly and shaking head). Not sure is it because of everyone also using the online methods. The Internet data ah..."* and not been trained in the application of technology in education (Ertmer et al., 2012), *"Not really sure this LMS, but I think.....la..... it is something to do with those teaching apps in online class", "I don't know make PowerPoint fancy – fancy one, you know (p), some people PowerPoint like video that one. Eh, that one I don't know how to make oh"*.

DISCUSSION

This main purpose of this study is to investigate the teachers' ICT readiness levels to conduct virtual lessons during COVID – 19 pandemics, as from the fact that online educator's readiness plays an important role in the succeed of virtual education (Hashim & Tasir, 2014). Results showed that internet connectivity and the accessibility to smart devices equally have a strong impact on the implementation of virtual education. Educators who worked hard to ready online materials were turned down by the students due to poor or no internet connection from their living area. Many students from the B40 families with siblings who were having online lessons at the same time were not able to attend virtual classes due to (a) not having enough devices and / or (b) the only smart device is used by their parent for working purpose.

Educational institutions were not ready for the hit by COVID – 19 and were not well – equipped with internet facilities nor provide professional ICT technical assistance gave a big pause to the virtual education. At the same time, administrators place most of the burden of running online lessons on the shoulders of educators without much physical aids, especially on the basic infrastructure like WIFI, even delay the progression of the virtual education. Added to this, the type of learning management system platform influences educators' readiness for online education. Too many introductions of learning management system to educators as trial and error for their online teaching and management purpose without proper training raise another issue among the educators and slow down their online teaching pathway. There is a previous study emphasized that the main obstacle to the online teaching was the lack of pedagogical or online course design skills (Gay, 2016).

This study has two possible limitations for the success of virtual education in secondary schools in Penampang, Sabah. First, the internet connectivity in Sabah is the biggest challenge for both educators and students. Second, smart devices accessibility is another issue among many families, especially on those B40 families. Without smooth internet connectivity and smart devices accessibility, virtual education will not as successful as planned.

CONCLUSION AND IMPLICATION

The main objective of this study focuses on the ICT readiness of teachers in virtual education as it improves the effectiveness of education. More ICT oriented educators enhance the scope of education by facilitating mobile learning and inclusive education. Limited study pinpointed the readiness of teachers, especially science teachers in providing an inclusive education through virtual platform was not high as they were not used to teach virtually, and they were not receiving sufficient training as well as support from schools and educational authorities (Chua & Bong, 2022).

Basic infrastructure like WIFI or Internet data plays an important role in virtual education in the classroom. The ICT facilities and technical assistance provided by the schools will aid in the level of ICT readiness among teachers. Study shows that infrastructure is important in ICT integration in schools (Simin & Ibrahim, 2015). Teachers' readiness in ICT shapes teachers' ICT competency. Teachers who are positive in exploring the use of ICT in the classroom and ready to integrate ICT in their teaching method can enhance students' interest and memory on what they have learned. It is important that teachers equip themselves with ICT knowledge and skills and be positive about ICT integration in the classroom so that they remain prepared to face any future challenges related to ICT. As education system is increasingly disconnected from society, especially after the hit by COVID – 19, teachers withdrawing into their old conventional teaching and learning methods can no longer be accepted. Being an important facilitator and implementor of 21st learning, teachers' perceptions of any innovative teaching and learning methodology must be implemented to speed up the virtual learning transformation especially in the secondary schools in Sabah.

The study has implication for educational institution to promote ICT readiness among teachers in succeed virtual education. In this study, it was found that basic infrastructure and technical assistance provided by the schools for the teachers are relatively important to promote more ICT ready educators. Adequate and relevant ICT training provided by the educational authorities are relatively needed and important too. Without sufficient and proper support from both educational institutions and authorities, virtual education during pandemic might not achieve the planned outcomes. Other than that, a strong financial aid and understanding for teachers' extra work time are other aspects that need to be studied urgently in order to provide a better virtual learning experience that will benefit both educators and students. Meanwhile, students' motivation and ICT readiness towards online learning are another contributing factor for the success of virtual education.

In conclusion, the finding of this study indicate that ICT readiness of educational institutions, teachers and students are equally important in the successful virtual learning in Sabah, Malaysia. Teachers' readiness in ICT can be expressed as a positive catalyst for the successful use of infrastructure provided by the Ministry of Education for a better integration of ICT in the classroom. Researcher would like to suggest to the school administrators to study again in their instructional and infrastructural preparation toward an effective and efficient implementation of virtual learning environment in their schools. Other than that, more programs on virtual learning should be prepared and carried out from time to time as a foundation for the readiness of teachers.

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