COVID-19: The Transformation of Learning and Teaching for Skill-Based Subject

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Abstract
The spread of COVID-19 has affected many sectors throughout the world including the education sector. All educational institutions were instructed to close when the government implemented the Movement Control Order (MCO), giving birth to a new way of learning- the online learning. However, the effectiveness of online learning is questionable when it comes to Technical Vocational Education and Training (TVET), which requires practical skills. In Malaysia, there are many courses offered in the technical and vocational education and one of them is Upper Secondary Vocational Education (USVE) in the field of Automotive. There are 29 articles in the Scopus search that discussed on the topic in general but only 24 of them fit the topic of this research. The research analysis found that the online teaching and learning coupled with the creative delivery of the educators is the best method for vocational education and training.
Keywords: Creativity, Teaching, Technical and Vocational Education, COVID-19

Introduction
        Malaysia and other 160 countries across the world (UNESCO, 2020) have affected by Corona virus that known as COVID-19. To curb the spread of the virus, movement vontrol order (MCO) and physical distancing are among standard operational procedure (SOP) have been imposed. The SOP has impacted many sectors directly including economy, social, tourism, transportation and educational sectors. In educational sector, the SOP has given an impact to the students' learning process, when it involves online learning. Two years have passed and there is no sign that the virus is ending anytime soon.
        Nevertheless, the process of learning needs to continue to ensure that the students are not left behind. When the government instructed that teaching and learning to be done remotely, all educators in the world agreed that online learning and teaching is the best option considering the situation that they were in at the moment. However, the approach of online learning is different considering the demographic profile of the learners such as their age, background, the accommodations and others. The educators' creativity in using the technological tools is required to attract the learners to involve actively in learning and teaching of the practical-based subject that conducted through online medium.

This online learning posed a big challenge for the TVET students especially the USVE of automotive field that also take the Malaysia Skill Certificate (MSC) Level 2. Therefore, is the online medium effective for their learning and teaching? What are the methods or approaches used by the teachers to replace the practical skills through online medium? How effective is the method used by the teachers in delivering content of practical-based lessons? Thus, this article highlights the approaches that teachers can adopt in order to teach these TVET students through online medium.

Problem Statement

The Digital Educational Learning Initiative Malaysia (DELIMa), *Cikgootube, EduWebTV* and social media applications, application like Google Meet or Microsoft Teams (live streaming), gamification, video, audio clip, e-book, recording and online tasks are among the most popular platforms used by many educators, as suggested by the Malaysia Ministry of Education (MOE). The learning materials such as video, audio, slides, notes and exercise sheets can be downloaded online.

Internet accessibility is one of the contributing factors for the inability of online learning to be conducted. According to (Jalli, 2020), the internet coverage in Malaysia, Singapore and Brunei only covers 80% and the remaining 20% face internet coverage issues. A study done in a rural school in Malaysia shows that only 29% of the population obtain a device for online leaning and only 38.9% has internet accessibility (Chin, 2020).

The online readiness survey done by the MOE showed that 670,000 parents did not own any gadgets at home for online learning (KPM, 2020). Chin (2020) found that 36.9% out of 900000 students cannot follow the online classes due to lack of facilities needed for online learning. Kumar *et. al* (2020) found that out of 38 respondents, 7 or 18% of the respondents didn't have online learning tools.

For students who do not have an internet connection or gadgets; for instance, a computer, laptop or even a smartphone, the traditional approach by using textbooks and other learning materials are allowed. For those who don't have the access to the internet, the learning materials should be delivered to the students through a proper medium and teachers can opt to use any methods suggested depending on suitability (KPM, 2021). One of the ways used by teachers is to schedule a time for students to collect the learning materials at school.

There are a few other factors that contribute to the challenges in online learning. For instance, issues in technology literacy, and students' readiness to accept changes and others (Chin, 2020). Bao (2020), added the challenge in online learning is caused by the students themselves for not being disciplined, inappropriate learning materials and the condition of the surroundings at home. Studies done by (Hazirah & Masayu, 2020) revealed that 35.1% of the educators agreed on the effectiveness of online learning whereas (Hin, 2020) found that students' readiness in online learning was at a moderate level only. Therefore, based on the above factors, what are the best methods as the main medium in their learning to be used to teach the USVE students who need practical training?

Methodology

There are 29 articles in total that discussed on the method of online teaching for practical-based subject based on the scopus database. The keywords used for these researches are "learning" AND "teaching" AND "covid19. Apart from that, the limitation in this study is also in term of the time range of the research done must be of 5 years back from 2016 to July 2021. Based on these limitations, the researcher was able to find 24 articles that

fit the online learning topic discussed above. There are many online platforms used by Malaysian teachers when conducting the online learning and teaching as stated by (Corbera et. al., 2020), online platform is the main medium of learning during MCO.
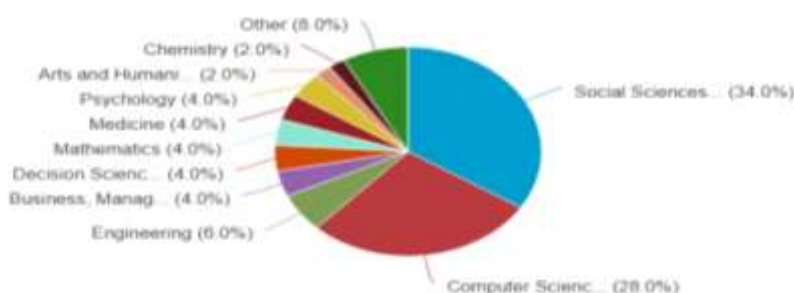
Pie Chart 1: The percentage of documents according to the field from Scopus database

The Pie Chart 1 shows the percentage of the articles according to field of study from the Scopus database. 34% of the documents, also, the biggest percentage, were from social sciences field. The remaining 28% were related to the computer science, 6% engineering while business management is 4%. Decision science, medicine and psychology make up 4%, arts and humanity as well as chemistry is 2% and 8% others.
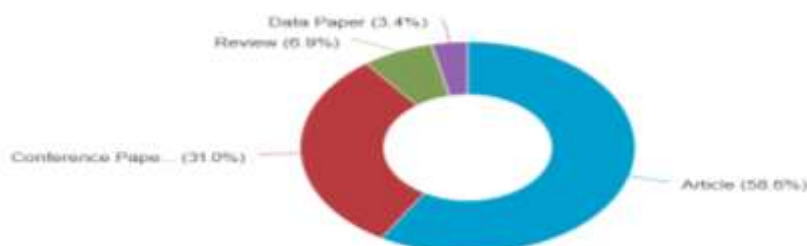
Pie Chart 2: Document by type from Scopus article

The Pie Chart 2 shows document by type where 58.6% of the documents are articles, 31.0% are conference paper while 6.9% are review paper and the remaining 3.4% are data paper.

Table 1 shows the summary of the Scopus articles and journal articles that discuss the teaching methods used during MCO. In total, there are 29 articles and journals but only 24 of them fit the current research. Lectures were done online using the internet as a medium of connectictivity (Currie, 2020; Al- Shammari, 2020; Anis, 2020; Dick, 2020; Dragoi & Herlo, 2020; Gutierrez & Espinoza, 2020). However, two-way interactive communications were stressed when learning such as copying lecture notes, questions and answer session and group discussion and these were done through the application of Google Meet, WebEx with window user support as well as slides presentation (Deepika *et.al.,* 2021) In addition to the applications of Microsoft Teams, Google Classroom, Zoom or using the internal operating system of the institution in Moodle or Blackboard was also used (Maier, 2020). Patil & Naqvi (2020), suggests that e-learning should be used through the digital platform like websites and media communication.

A study done by (Syed, 2021) on the perception of online learning and teaching with the online evaluation found that conference like platform and e-teaching using video showed the highest usage among students. Video is preferred because students are able to rewind the recording until they fully internalised the topic. It was also found that Zoom, CANVAS, Google Meet, dan WebEx were frequently used in the online classes. This view is supported by (Al-Murshidi, 2020) who asserts that learning and teaching through video is an interactive way of

learning as students can repeat the video multiple times to help them increase their knowledge and academic skills. This learning could enhance related learning behaviour apart from giving the inspiration to the teachers to share their ideas and expertise through the video created (Area-Moreira et. al., 2020; Mohammadian, 2020). Kannan *et. al*. (2020), suggests that online learning, Learning Dialogue (LeD), eBook, Book Roll together with supporting material of conference-like video is really helpful in the learning and teaching process of the students.

In addition to that, (Nuere & Miquel, 2020) in his study found that online learning could be done through various medium such as video, model, direct communication, power point presentation and these depends on the creativity of the teacher in grabbing the students' attention. Teacher or educator knows how to adopt and adapt in order to ensure the effectiveness of their teaching. Malhotra *et al*. (2020), suggested 6 online teaching strategies that could give a good impact in the learning process namely (i) pedagogy and instructional, (ii) content, (iii) delivery (iv) platform, (v) ethics and (vi) evaluation.

According to (Balinda & Encarnacion, 2020), through online learning, teachers can review students' work using Grammarly, a tool that could increase the quality of students' writing and minimizing the evaluation process of the teachers. An article reviews by (Dua *et. al.,* 2020) stated that ViRL Collaborative program founded by a team of program director from various institutions has given impact to the students. Experts from these institutions were called on to share their knowledge through online platform all at the same time.

To add, overall evaluation done by (Obeidat *et. al*., 2020) towards his e-learning method found a positive impact while (Scull *et. al*., 2020) revealed that online learning method is the best innovation step in the education field and it should continue in the future. A systemic steps and technology advancement needs to be aligned to ensure that learning does not stop along the period of COVID-19 pandemic. Bouziane *et. al* (2020), in his view towards online distance learning state that teachers are the keyperson that could ensure the effectiveness of learning whereas the students' role is to guarantee the smoothness of the online class. Besides that, parental support could give a better effect in helping with the learning and teaching process.

However, the research also found a few factors discussed that contribute to challenges in online learning namely lack of device for online learning such as laptop and internet accessibility (Hibbi et. al., 2020). Despite these minor challenges that posed some difficulties in online learning, traditional method of learning was used in the learning and teaching process to help the students to get equality in education. One of the initiatives used was the preparation of learning module by the school or respective educational institutions.

Table 1

Summary of articles and Journals in Scopus related to learning and teaching during COVID-19

Autor	Year	Title	Learning Proses	Publisher
1. Syed K., Kandakatla R., Madhulita, Yadav R., Himasagarika R.	2021	Responding to COVID-19 and transitioning to online learning Evaluation of an institution wide capacity building efforts on technology-enhanced learning	Platforms for online classroom video conferencing and teaching through platforms such as Zoom and CANVAS, GoogleMeet, and WebEx.	Rajarambapu Institute Of Technology
2. Deepika A., Kandakatla R., Saida A., Reddy V.B	2021	Implementation of ICAP principles through technology tools: Exploring the alignment between pedagogy and technology	Conducting online lectures interactively students are asked to copy notes, question and answer sessions, group discussions so that learning takes place in two ways example user window, slide presentation	Rajarambapu Institute Of Technology
3. Currie G., Hewis J., Nelson T., Chandler A., Nabasenja C., Spuur K., Barry K., Frame N., Kilgour A.	2020	COVID-19 impact on undergraduate teaching: Medical radiation science teaching team experience	Impact on teaching staff where face-to-face teaching is replaced by online learning	Elsevier Inc.
4. Dua A.B., Kilian A., Grainger R., Fantus S.A., Wallace Z.S., Buttgereit F., Jonas B.L.	2020	Challenges, collaboration, and innovation in rheumatology education during the COVID-19 pandemic: leveraging new ways to teach	VRL Collaborative with expert speakers invited by the program director of this institution to give online talks simultaneously	Springer Science and Business Media Deutschland GmbH
5. Kannan V., Warriem J., Majumdar R., Ogata H	2020	Learning dialogues orchestrated with BookRoll: A case study of undergraduate physics class during COVID-19 lockdown	Online learning, Learning Dialogue (LeD), such as the BookRoll eBook, along with conferencing support tools such as video	Asia-Pacific Society for Computers in Education
6. Area-Moreira M., bethencourt-Aguilar A., Martin-Gómez S.6.Area-Moreira M., bethencourt-Aguilar A., Martin-Gómez S.	2020	from blended teaching to online teaching in the days of Covid19: Student visions	Online learning by diversifying methods, video, live chat, presentation slides etc by practicing blended teaching	Red Universitaria de Campus Virtuales
7. Mohammadian H.D., Shahhoseini H., Castro M., Merk R.	2020	Digital Transformation in Academic Society and Innovative Ecosystems in the World beyond Covid19-Pandemic with Using 7PS Model for IoT	Video apps like Zoom and Adobe Connect, messenger apps like WhatsApp and Telegram, video, YouTube, and video chat apps like Skype zoom sustainability with environmental, economic, social, educational, cultural, technical, and political aspects	Institute of Electrical and Electronics Engineers Inc.
8. Kumar A., Malhotra S., Katoch A., Sarathkar A., Manocha A.	2020	Webinars: An assistive tool used by higher education educators during Covid19 case study	Webinars are live lectures broadcast through the internet Zoom, GoToMeeting, GoToWebinar, Google Meet, Cisco Webex	Institute of Electrical and Electronics Engineers Inc.
9. Malhotra S., Dutta R., Amit Kumar, Sagar Mahna D	2020	Paradigm Shift in Engineering Education during COVID 19: From Chalkboards to Talk Boards	Webinar or online through 6 strategies (i) pedagogical and instructional strategies; (ii) content; (iii) presentation style; (iv) platform; (v) ethics; and (vi) assessment	Institute of Electrical and Electronics Engineers Inc.
10. Qadir, J., Al-Fuqaha, A.	2020	A student primer on how to thrive in engineering education during and beyond COVID-19	Online learning "Introduction" and "Conclusion" eg. Virtual lab/simulation	American Chemical Society
11. Al-Shammari A.H.	2020	Social media and english language learning during Covid-19: KILAW students' use, attitude, and	Online learning, webinar etc.	English Language Education Journals
12. Gutierrez E.J.D., Espinoza K.G.	2020	Educating and evaluating in times of coronavirus: The situation in Spain	Online learning	Hipatia Editorial
13. Patil D., Naqvi W.M.	2020	COVID-19 and education system: Impact of current pandemic on adaptive learning strategies in medical education system	Forms of digital platforms (i.e. websites and conversational media)	J. K. Welfare and Pharmascope Foundation
14. Maier V., Alexa L., Craciunescu R.	2020	Online education during the COVID19 pandemic: Perceptions and expectations of romanian students	Microsoft Teams, Google Classroom or Zoom or by using their internal Learning Management System in Moodle or Blackboard	Academic Conferences and Publishing International Limited
15. Nuere S., de Miguel L.	2020	The Digital/Technological Connection with COVID-19: An Unprecedented Challenge in University Teaching	Technology Teaching tools (online learning) + Creativity + Access model+etc	Springer
16. Balida D.A.R., Encarnacion R.	2020	Challenges and relationships of e-learning tools to teaching and learning	Online learning	Academic Conferences and Publishing International Limited
17. Anis S.N.M., Ibrahim M.A., Tahir L.M., Abu B., Khan A., Adiz R.A.	2020	COVID 19 and campus experience: Survey on online learning and time spent during the movement control order (MCO) among Malaysian postgraduates	Online webinars like Webex	Institute of Advanced Scientific Research, Inc
18. Hibbi F.-Z., Abdoun O., Khatir H.E.	2020	Coronavirus pandemic in Morocco: Measuring the impact of containment and improving the learning process in higher education	E-learning, online learning – video, You Tube, webinar etc	International Journal of Information and Education Technology
19. Dragoi V., Herlo D.	2020	Aspects on e-learning during the COVID19 pandemic at the university	Online / e-learning	IADIS Press
20. Bautista A.S., Lissen E.S.	2020	E-learning in 15 days. Challenges and renovations in Primary and Secondary Education of the Republic of Croatia during the COVID-19 crisis. How have we Introduced distance Learning?	Online learning (Distance learning model)	Universidad Nacional de Educacion a Distancia
21. Al Murshidi G.	2020	Videotaped teaching and learning methodology – an experiential learning and action research approach	Video recording Interactive Learning, as it can be repeated. Effective to provide an understanding Technology allows students to create videos to demonstrate the experience	JAI Press
22. Dick G., Akbulut A.Y., Matta V.	2020	Teaching and learning transformation in the time of the Coronavirus crisis	Technologies such as WebEx or Zoom or creating a narrated PowerPoint presentation	Routledge
23. Obeidat A., Obeidat R., Al-Shalabi M.	2020	The Effectiveness of Adopting e-Learning during COVID-19 at Hashemite University	Elearning	Science and Information Organization
24. Scull J., Phillips M., Sharma U., Garnier K.	2020	Innovations in teacher education at the time of COVID19: an Australian perspective	Online learning	Routledge

Discussion

The spread of COVID-19 forced the educational sector to take drastic action in continuing the learning and teaching process. Enhancing the current online education or e-learning is the best way rather than disregarding the students' need in this situation. A variety of online learning methods were created through the educators' creativity and determination in order to increase students' understanding of technical knowledge of the subjects besides reaching the objectives of the lesson.

All in all, the learning and teaching were done online with a variety of teaching method depending on the educators' creativity. Besides that, students' education level of study; either at primary, secondary or tertiary, were taken into account when designing for the lesson. Generally, online learning is not novel at the tertiary education level where (Rabeah, 2006) discovered that e-learning system was used in University Technology Malaysia (UTM) since a few years back but it was only officially introduced in semester 2, 2004/2005 academic session. This e-learning was handled by digital services department and can be reached at URL: http://elearning.utm.my. The system provides an online space to all lecturers and students to interact with one another. However, at the early phase of the introduction, it was not widely used due to few reasons such as lack of devices among students and the internet accessibility issues.

Even with the advancement of today's technology, there are a few reasons that contribute to low students' participation in online learning especially at secondary education level. The most common one is lack of online learning tools such as laptop, smart phone and internet applications (Hibbi *et. al.,* 2020). There are also a few other reasons like the abrupt connection lost due to high traffic or the internet and depending on the geography of a place, data was finished or not enough (Chin, 2020).

The traditional learning and teaching method of face-to-face are still used at the primary and secondary education levels (KPM, 2020). Online learning is seen as safe alternative to continue the learning process besides other alternative methods depending on educators' creativity. The transition towards online learning is becoming popular at the primary and secondary education levels as well since the MCO. The educators were instructed to conduct learning and teaching via online medium as instructed by the MOE (KPM, 2021). On 27th March 2020, a circular on the guidelines in conducting online learning and teaching due to COVID-19 and a circular dated 2nd February 2021 on the guidelines for online learning at home version 2 as well as guidelines for online learning and teaching timetable at home. The manual ware used as a reference for educators to conduct a structured and organized lessons for the students to follow the lesson at an optimum level (Abd Latip, 2020). This could not be done without the help and support from many organizations especially the Malaysia MOE, the state education department, district education department, the school, teachers, parents/guardian and the community.

The commitment of the Malaysia MOE to ensure the continuity of learning in technical education is highly commendable. They drafted guidelines for the learning and teaching of technical and vocational education. The biggest challenge for educators in technical and vocational field us to conduct and prepare online lessons for both theory and practical-based subjects. Online learning is the main medium for learning and teaching process to take place during the pandemic using many popular applications such as Zoom, GoToMeeting, GoToWebinar, Google Meet, Cisco Webex. Besides that, messaging applications such as WhatsApp dan Telegram, video, YouTube, and videocall application like Skype and Zoom were commonly used as it provides two-way communication in real time. Using video in online

learning and teaching as additional material offers positive impact and could grasp the attention of the students.

A smooth learning and teaching process depends on the method and application used by educators and the most important thing to ensure that the objectives of the students' learning are met. The method and application used reveal the creativity of the educators in delivering their lesson effectively just as in traditional classroom setting especially in the technical field of study.

A creative of USVE educator can identify problem and tools to be used in class for an effective learning and teaching session (Najib & Sarimah, 2021). The educators used a combination of online medium to deliver the lesson and distributing learning materials to the students manually. It was found through study that the best teaching method for USVE of automotive subject are listed as follow:

i. Teacher choose topic lesson and exercise depending on creativity.
ii. The lesson is equipped with a video recording.
iii. Students collect tool box kit and learning materials for the lesson at the school guard house.
iv. Students complete the exercise based on task given.
v. Students submit their completed work back to the school guard house.
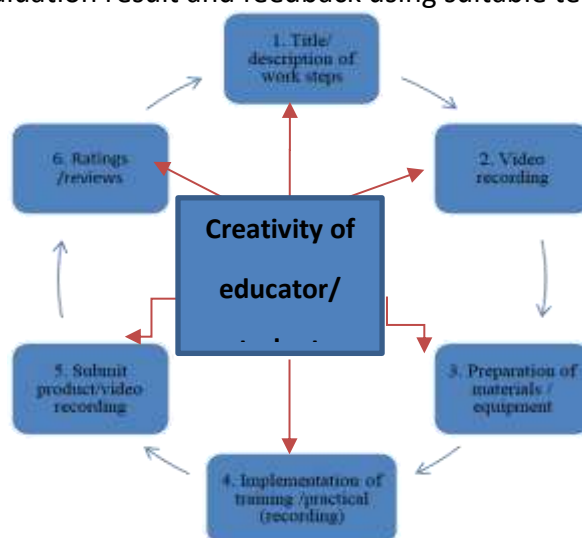vi. Teacher gives evaluation result and feedback using suitable technology application.

Figure 1: Steps in conduction lesson for USVE of Automotive subject

Besides the methods mentioned above, teachers made endless efforts to ensure students' learning despite the challenges during this pandemic. In Malaysia, due to the spike of cases, the Ministry of Education has suggested a rotation system to conduct learning at school, online learning and giving freedom for teachers to use appropriate platform that suit the students' need (Fadzliyah *et. al.*, 2020).

At present, online learning is still a preferred approach by teachers (Dhawan, 2020). Online learning can be divided into two methods which are synchronous and asynchronous learning. Synchronous learning refers to learning that happens at the same time for teacher and students. Learning takes place at the same time or in real time where teachers and students could interact directly online. Meanwhile, asynchronous refers to learning process that happens at a different time between the teacher and students. According to (Lorenza &

Carter, 2021) found out that the implications of choosing online learning under certain circumstances can be considered in learning design for future use including the choice of technologies used, increasing the skills of higher education educators and unforeseen benefits to the students. In addition to that, students are able to learn according to their schedule and at a designated time (Komang & Astini, 2020). Among the online platforms used for synchronous learning include Google meet, Microsoft teams, Zoom, Webex whereas for asynchronous learning, Google classroom, WhatsApp, Telegram etc (Muniroh, 2020). These applications allow teachers to have control over time, management and delivery (Rubb & Jones, 2020). According to (Baran & Alzoubi, 2020), an out-of-class control can be effective for learning process if it is planned meticulously. Teachers have to be smart in strategizing according to the subjects taught especially in time management. Teachers have the authority over time to guide the whole course (Saverino, 2021). Time control is important especially in the concentration or focus of the students in the learning. Kanojiya (2020), who studied from students' perspectives have found a high acceptance of online learning approaches during the pandemic. Acceptance from all key parties especially teachers, students and familial support play an important role in the smooth running of online learning (Zhao & Watterston, 2021).

Teachers used different methods as alternatives to ensure students are not left behind including planning activities that suit the students, venue and their field of study (Atmojo & Nugroho, 2020). Apart from that, the usage of high-quality video could help in increasing students' knowledge (Fatani, 2020).

Porkrel & Chhetri (2021), stated that teachers struggle to find suitable methods in conducting an effective learning. Their main challenge is when there are students who are unable to follow the lesson due to covid. In tackling the issue of students' absenteeism during pandemic, teachers adopt an innovative approach which indirectly increase the skill of information technology usage and communication among students (Yu *et. al*., 2021). Blended learning is also considered as a solution particularly for students who are not well-equipped or face internet connection issue. The advantages of using blended learning include individual learning, support and encourage free and collaborative learning, increase the involvement of pre-service teachers in learning process and prepare flexible lesson which can be done anytime and anywhere (Martin *et. al*., 2015). In addition to that, blended learning could enhance the science process skill and learning outcome (Harahap, 2019). Blended learning strategies is found to be more effective in increasing students' learning outcomes and their science process skills as compared to the conventional learning strategies (Yustina *et. al*., 2020). Blended learning has its own creative value in conducting a meaningful lesson. A teacher's creativity in deciding the best learning methods help in the learning process apart from displaying students' creative side (Kanojiya, 2020). Students' creativity can be seen with the aid of online medium. Students are free to explore learning with the use of existing facilities (Handayani *et. al*., 2020). Any changes done in the teaching process is to guarantee continuation of effective learning process under any circumstances (Zhao & Watterston, 2021). Although the pandemic is an unprecedented occurrence which has impacted our lives in one way or another, we must continue with our lives especially in the education field to make sure that no student is left behind.

Conclusion

The main goal for all educators is to deliver an effective lesson. In doing so, the selection of method and technique of teaching is a vital element to consider before conducting the lesson. One of the creative ways to be used in class during the pandemic COVID-19 is to fully utilise the technology-based platform like Zoom, GoToMeeting, GoToWebinar, Google Meet, Cisco Webex video, YouTube, live chat like Whatsapp or Telegram. These platforms allow educators to conduct classes creatively and effectively. The combination of learning theories and technology when conducting learning and teaching session is regarded as educators' creativity in conducting their lesson in class. Without a doubt, there will be various challenges in education and as an educator. Educators' creativity and technology can help the educators to to deliver effective teaching process to the students.

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