Assessment of Student Engagement in Open and Distance Learning for Construction Management

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Abstract: The traditional method of teaching and learning have significantly changed in the higher education due to the COVID-19 pandemic. The development of Open and Distance Learning (ODL) offers opportunites for students' to improve their technological literacy especially in managing their academic work and performance from a distance geographical location. Many researchers have made an attempt to investigate the student engagement in relation to various context of higher education. This study assess student engagement towards ODL in construction management studies . A literature review has been conducted to facilitate the aim of this article.The key discussion suggests that ODL has moderate to high level of student engagement. Therefore, this study recommends the adoption of Online Student Engagement (OSE) approach as an instrument in assessing the student engagement through ODL in the aspect of skills, participation, performance and emotional.

Keywords: Online Learning, ODL, Student Engagement, Online Student Engagement

INTRODUCTION

The advent of COVID-19 has significant impact to the higher education system globally (A. Patricia Aguilera-Hermida, 2020; Chan et al., 2020; Pasion et al., 2020; Husin et al., 2020; Qazi et al., 2021).Conventional teaching and learning is no longer the only student learning mode in the higher education.The disruptive technology and innovation has inevitably imparted to the mode of online learning for either synchronously or

asynchronously. All students have to adhere and adapt to the call for self-isolation and continue their lesson through online platforms for as long as it needed to curb the COVID-19 pandemic. As a result, universities are required to take action to respond to the change with little to no preparation for online teaching and learning. Open Distance Learning (ODL) is one of the methods to continue the teaching and learning process in an online learning environment. Simpson (2018) defined ODL as learning activities that combines open and distance learning that makes education available for anyone without any specific entry requirements or age, but may come with a fee or is entirely free. ODL also provides education for all without any boundaries and often emphasized on open access and flexible learning to enable learners to have the opportunities of education (UNESCO, 2002). Given the rise of information technology coupled with the aftermath of COVID-19 pandemic, ODL has became the ubiquitous method of online teaching and learning mode in the higher education level (Md Saidi et al., 2021; Hussin et al, 2020; Selvaras, 2020; Zuhairi et al., 2021).

However, online-learning (i.e. ODL) is not as convenient as one could imagined especially for students. Bower (2019) argues if students face trouble pertaining to technology when using ODL platforms as they suffer a loss in social connection and mental engagement which negatively affects the students' learning outcomes. The study conducted by Choy and Queck (2016) highlights that without a clear instructions/guidelines and discussions conducted by instructors during the online lessons, it could potentially harm the learning experience of students when ODL is conducted. This is due to the reason that students are used to attending face-to-face learning and have already developed the ability to engage in a physical classroom environment with the instructor. Students can have rich discussions among themselves and tutor regarding to the lesson (Robinson, 2012). In online learning environment, students tend to disengage with the synchronous or asynchronous online lesson due to the distance and capacity of internet connectivity (Cho and Cho, 2014; Hussin et al., 2020). Although students can learn online lessons anytime and anywhere provided with the access of internet connection, the level of student engagement in ODL when it is conducted in a longer period of time is still unclear. Therefore, it is an issue that must be addressed to ensure that students are able to achieve the intended learning outcomes.

LITERATURE REVIEW

2.1   Open and Distance Learning (ODL)

Open and Distance Learning (ODL) has been gaining momentum in the past decades (Md Saidi et al., 2021;Bordoloi, 2018; Ghosh et al., 2012; Dzakiria, et al., 2005; Davis, 1996; Hogson,1993). The main aim of ODL is to provide equitable access and various means to education (Selvaras,2019). (3) It is also known as " Self-learning", " Independent learning", "Flexible learning" implying accessible learning that is self-regulated and the ability to learn at a certain pace using advance computer technologies and tools (Bordoloi, 2014; Yang et al., 2014). Online tools such as Google Meet, Zoom, Microsoft Teams, Loom, Whatapps are the common tools used to communicate, collaborate and exchange information between students and instructors (Md Saidi, 2021; Hussin et al, 2020). Students are able to access online materials through mobile devices and social media to communicate with their peers and instructor either verbally or non-verbally anywhere at anytime (Hussin et al, 2020). On the other hand, tutors can prepare a pre-recorded videos, live session or both depending on their availability and the situation. The survey results by Md Saidi, et al. (2021) revealed most students prefers synchronous online lesson compared to asynchronous, while both students and educators prefers using Whatapps and Google Meet as their main tool for communication. A study by Luaran, Jain, and Abd Rahman (2016) indicate that there are positive results when using Whatapps as a platform of academic materials sharing. The study also reported that students have more confidence and participates actively through instant discussion via chatting or voice message.

Although students have more flexibility in their learning through ODL, it shows that their persistence and engagement to cope with their academic activities gradually deteriorates. In the study conducted by Selvaras (2019) , majority of undergraduates' law students prefer blended learning (i.e. classroom learning and online learning) over learning legal lesson entirely online. A recent study conducted by Hussin Awang and Mohd Fatzel (2020) reported that one-third of accounting students do not enjoy learning online through ODL and

majority of the students indicates poor internet connectivity is one the contributing factor that contribute to the situation where students tend to dislike ODL.Thus, the academic performance of students that face challenges in engaging in online lesson through ODL can be affected (Zuhairi, et al., 2019; Dzakaria et al., 2005)

2.2   Student Engagement

The relationship of student engagement and online learning is a serious issue in higher education in the plight of COVID-19 pandemic situation (Pasion et al., 2020 A. Patricia Aguilera-Hermida, 2020; Bolliger and Martin, 2020; Henrie et al., 2015; Shukor et al., 2014). Barkley (2010) defined student engagement as the continuous activities experienced by the students that is resulted from a mutual discourse between active learning and student's motivation. Kuh (2009) described student engagement as the time and energy spent by student activities that is measured to achieve the university's objectives and outcome, and the motivation of students to partake these activities.Through online learning, students are able to take control over their academic activities and responsibilities to complete their courses. Either synchronous or asynchronous mode, student requires self-motivation, self-discipline, and good time management skills to adapt with the pace of the course (Chan et al., 2021). Several studies found out student engagement and online learning has a positive effect to satisfaction with online education and learning outcomes including critical thinking, examination results, and practical application (Gray and DiLoreto, 2016; Hamptom and Pearson, 2016). Also, given the great flexibility during ODL, students are also able to gain their education attainment at the same time fulfilling their other responsibilities (Tanis et al., 2020; Stone et al., 2016).

However, the sudden change and unreadiness of students to move to online learning due to unforeseen circumstances have undermine their ability to engage and focused to online lessons (Aguilera-Hermida, 2020; Hodges et al., 2020; Murphy et al., 2020). Students have reported that they are under distress and have formeda negative perception towards online learning experience and exacerbated by the lack supporting resources (Aguilera-Hermida, 2020). Students'

dedication to online learning decreases due to the lack of experience and leads to mounting anxiety and passive involvement (Pasion et al., 2020). Previous studies also shows that online students have lower level of attachment, higher feeling of isolation and lack of presence and participation in online learning (Lane et al., 2015). Therefore, the implementation of ODL with little and no preparation has negatively affected student engagement in online lessons. Hence, this study aims to assess students' engagement towards ODL in construction management programme on undergraduates students from Universiti Teknologi MARA (UiTM) Shah Alam, Malaysia.

2.3   Construction Management Programme

The Construction Management Programme offered in UiTM Shah Alam offers a curiculum that emphasise on process, analysis and comprehensive understanding of theories and methods applied in construction and development (AP246, 2021) . The programme outcome is for students to acquire a certain set of skills including problem-solving skills, technical skills, IT skills, communication skills and leadership skills. The aim of the Construction Management Programme is for students to understand the complex nature of construction, methods and procedures which often requires teamwork and interdisciplinary collaboration experience (Jin et al., 2018). Didactical approach of teaching and learning in construction management is changing in contemporary times. ODL is a new learning method that exposes student with various online learning platforms such as Ufuture, MOOC, Moodle, Google classroom and etc.

With the rapid digital transformation, ODL can be defined as the foundation of new IT-driven courses in the Construction Management Programme such as Building Information Modelling (BIM), Virtual Reality (VR), Internet of Things (IoT) and Artificial Intelligent (AI). A study by Elgewely et al.(2021) found out that the VR environment potentially enhances student's engagement, motivation and achievement. Clevenger et al.(2012) argued that BIM-visualised models and related databases have the capability to provide an enhanced platform for education. Not to mention, the influence of AI and IoT

has significantly influenced the Construction Management Programme to better facilitate students in multiple software skills coupled with social skill (Pan and Zhang, 2021; Fang, 2020). It is essential for students to be able to interact with multiple construction technologies in supporting visualisation, virtualisation, and autonomous processes in a digital construction environment when they graduate (Olantunji, 2019).

However, ODL in the Construction Management Programme faces several challenges as the curriculum requires hand-ons activities such as industrial training, fieldwork, laboratory work and community project. To achieve certain learning outcomes, students are required to conduct laboratory tests, handling survey equipment, conduct survey activities, having the ability to use software and reaching out to the community. For example, the ability to use BIM software requires appropriate teaching and learning resources; finding the right balance between theory and practice, technology and process, traditional and emerging construction management methods; and training of the course instructor (Poulitaival and Forsythe 2016; Olantunji, 2019). Similarly, to assess student engagement in ODL for Construction Management Programme requires balance both theorectical and practical application to equipped students the necessary knowledge and technical skills before entering into the workforce and further develop their professional career.

2.4 Theorectical ODL Engagement

In the theorectical ODL engagement, the Construction Management Programme primarily conducted academic activities via the university's online learning platform(i.e. Ufuture) (Abdul Karim, 2020). The online learning platform provides an interface for both students and instructors in managing the course materials for enabling easy access to lecture notes or presentation slides, conduct classes either synchronous or asynchronous approach, allow students and instructors to chat in a forum discussion, provide a central storage location to upload/download assignments, prepare final assessments and quizzes as well as to track the students learning progress and online attendance.

There are several academic activities that are being practice in the Construction Management Programme to engage students in ODL session. In synchronous online learning– students and instructors meet online simultaneously at different locations using web/video conferencing tools (Mackay and Fisher, 2014). The functions of web/video conferencing tools is to enable students and instructors to engage in the same slides presentation, making verbal interaction or text chatting, sharing various documents file or weblinks, and e-whiteboard to scribble on (Downes, 2004; Mackay and Fisher, 2014). Online interaction between students and instructors is the key that positively affects the student engagement(Baratuci and Linse, 2002). However, it is not easy to conduct synchronous online learning as there are several challenges (Mackay and Fisher, 2014). Firstly, the lack of non-verbal cues between students and instructors. More often that not, it is difficult to make eye contact in web-conferencing as most students shut their video camera that severly degrades the communication experience. Secondly, the camera position mounted on the top of laptop or PC often making eye-contact looking downwards on the screen instead looking directly into the camera. Furthermore, limited internet bandwidth and loss of wireless signal impede student engagement in ODL experience especially those living in the remote areas. To overcome these issues, asynchronous online learning is the alternative approach in ODL session.

Asynchronous online learning is the most commonly used format for autonomous learning activities. ODL students can plan and monitor their own self-learning activities according to their pace (Mackay and Fisher, 2014). There are several ways to conduct asynchronous online learning that includes discussion boards/forums, online textbook, video and audio streaming, and Massive Online Open Course (MOOC). Discussion boards/ forums can be conducted in both real-time or whenever students or instructors are online (Wijekumar and Cameron, 2007). Students and instructors can discuss the course content materials and provide their opinions and comments effectively in the discussion boards/forums. A study reported that discussion board is one of the best methods of learning asynchronously (O'Neal, 2009). On the other hand, online textbook offers students interative textbook contents, assignment questions, quizzes with auto-grading

and answers, multimedia content, podcasts and interactive simulation. Unfortunately, online textbook has limited effectiveness towards student engagement (Chen et al., 2011).

Furthermore, video and audio streaming is one of the most favourable method in asynchronous online learning as students likes to watch animated and lively videos via video streaming platforms (i.e Youtube,Pre-recorded lectures) to stimulate learning experience. Students can learn quickly by rewinding and fastforwarding the video according to their liking and drop comments if they have any questions. However, the method depends on the contents, lengths, visual attractions and high quality audio to engage student learning experience. Lastly, MOOC has gained popularity and fast growing trend among ODL learners or students (Mackay and Fisher, 2014). This online platform emphasise on self-paced learning and playing an active role in the learning process. The plethora of online courses offer in MOOC provide students more credibility to online education and desire for more knowledge and learning. On the flip side, MOOC is the most difficult for ODL students to complete as they are not self-motivated. The sheer lack of real-time interaction worsen the student comprehension and unenjoyable in learning (Mackay and Fisher, 2014).

The Construction Management Programme adapts both synchronous and asynchronous in ODL environment whenever it is possible to allow students to experience every facet of ODL experience. The university's online-learning platform (i.e Ufuture) tremendously help both students and instructors to manage online classes, access to course materials and assessements, online interaction either verbally and non-verbally to track student engagement and learning performance. The ODL theorectical engagement is not complete without exposing student to experience the pratical skills in the Construction Management Programme.

2.4 Practical ODL Engagement

In terms of practical ODL engagement, the laboratory work is important for construction students to achieve construction

management knowledge (Abdulwahed and Nagy, 2009; Auer et al, 2012, Jeschofnig and Jeschofnig, 2011; Hamadou et al, 2008). In the past 50 years, construction education is more on theoretically driven. But, this phenomenon in education has change the approach used during lectures from a more classroom based towards a laboratory based approach to enhance student's hands on practical skills. Experiential learning by hands-on skills is the best method to gain construction expertise (Auer et al, 2012, Jeschofnig and Jeschofnig, 2011; Hammadou et al, 2008). Practical skills can be referred as learning through experience where the interactive approaches such as using real tools and equipment in a laboratory. Through the laboratory based approach, the instructors present the materials through lectures and the students will give feedback and interactions with the instructor (Abdulwahed and Nagy, 2009; Long et al, 2012; Hamadou et al, 2008).

There are several hands on learning that basically being practices in construction programmes such as traditional labs, home experimenter kits, simulations, remote labs, scenarios and considerable interactivity. Recently, the education sector faced with the difficulties to deliver the practical aspect due to the pandemic covid situation that happen globally. In order to enhance the engagement of students for practical ODL, remote or virtual labs are relevance to be used as delivery methods. There are several design of virtual and remote labs for ODL students as an options to enhance engagement with ODL students such as videos of lab sessions (Auer et al, 2012, Auer et al, 2010; Long et al, 2012; Chener et al, 2011). But, this delivery method does not give students real hands-on interaction (Tee and Karney, 2010; Auer et al, 2010). Besides that, practical online learning can use condensed lab sessions on the main campus or some satellite campus. Unfortunately, this method is more expensive for students and the quality of lab can be variables due to the changing on satellite campuses with the various levels of laboratory expertise provided (Long et al, 2012; Hamadou et al, 2008). In addition, portable kits can also be used as practical delivery methods. This portable kits need to be shipped to the students. But this method will be a compromise because this kits must be affordable and portable to the students. Otherwise, the expensive lab sessions will be left out (Long et al, 2012).

Furthermore, simulation also can be used as practical delivery methods for ODL students. From the previous literatures, there are no significant evidence shows the negative sides of using remote labs or simulation in substituting conventional lab. The analysis showed that there is greater awareness on experimental design and more cases of high critical thinking were developed amongst students when using virtual ODL compared to physical labs (Auer et al, 2012, Jeschofnig and Jeschofnig, 2011, Hamadou et al, 2008). On the other hands, there are still concerns about student regarding using of virtual lab, they cannot experience the real hands-on skills and it may affect how they develop a sense of reality on the learning outcomes (Tee and Karney, 2010). Thus, to ensure the student learning outcomes is achieved, it is crucial to measure and assess the extent to which the student acquired the necessary practical skills and hands-on experience.

2.4 Assessment ODL Engagement

In the Construction Management Programme, assessment of students engaged in ODL is important to be reviewed as to ensure the quality of the programme. There are two types of assessments that can be used as a method of evaluation such as formative assessment and summative assessment. The evaluation of students should be done both formatively and summatively to ensure the assessment engagement among ODL students (Lawton et al, 2010; Lap et al, 2010; Aravinthan, 2011). Online quizzes and assignments are the best practice to evaluate student ODL assessments. Online quizzes is a method of assessment for students to increase their participation in class during the ODL process (Cooper et al., 2007; Pai, 2012). Therefore, the marks from the online quizzes can contribute about 10 percent to the student's final grade.

To increase the student engagement, students should be allowed to retake online quizzes as many times as possible to improve their understanding on the knowledge they have learned (Cooper et al., 2007; Pai, 2012). Previous literature shows that ODL students generally give positive feedback about online quizzes because it can help them to increase their understanding on the current lecture materials. Analysis shows that the online quizzes are useful to test the basic concepts but

not the sophisticated knowledge (Lawton et al, 2010; Lap et al, 2010; Cooper et al., 2007). To fill in this gap, online assignments can be used to test the diagnostic knowledge where students can give their feedback when they progress through the course. Research reveals that online assignment can enhance student understanding by working on problems demonstrated as a significant improvement in achievement (Cooper et al., 2007, Dedic, 2008). Students also can upload all their online assignment via e-portfolio as their graduate marketability when they finish their study (Lawton et al, 2010; Lap et al, 2010; Cooper et al., 2007). Lastly, the online examination can also be conducted to evaluate the student ODL engagement throughout the semester.

There are several challenges to conduct online examination to ensure the educational quality and security cannot be compromised (Malik,2010; Mehrabian, 2008). Further actions need to be consider to deal with students who fear poor performance in the online exam environment (King et al., 2009). Previous literature also suggested the open book online examination can be allowed to evaluate students on application questions (King et al., 2009). However, online learning evaluation reveals that, generally, most of construction course students feel that traditional classroom learning still offers greater interactivity and satisfaction as compared to synchronous online learning (Clarey, 2009). Research also found that the learning outcomes are probably at least equivalent or better with synchronous online learning sessions as compared to classroom instruction (Lawton et al, 2010; Lap et al, 2010; Clarey, 2009).

THE ONLINE STUDENT ENGAGEMENT (OSE)

The design and variable of the student engagement was derived from the structure of Online Student Engagement (OSE). OSE was developed by Marcia D. Dixson in 2015 to study students engagement associated with online environment (Dixson, 2015). The underpinning approach of OSE is the intergration of social construtivism, the Community of Inquiry (CoI) model and the fundamental of student engagement in traditional classroom that redefine engagement in online learning environment(Dixson, 2015). The engagement involves students putting their effort in learning skills and understanding teaching materials, demonstrate a meaningful discouse with

their classmates and the ability to emotionally connected to their learning (Dixson, 2015).Therefore, OSE approach is to measure the extent to which student are actively involved in learning, a sense of how they feel about their learning and mutual relationship with the learning contents, instructor and their fellow classmates in the aspect of skills, participation performance, and emotional in Figure 1.
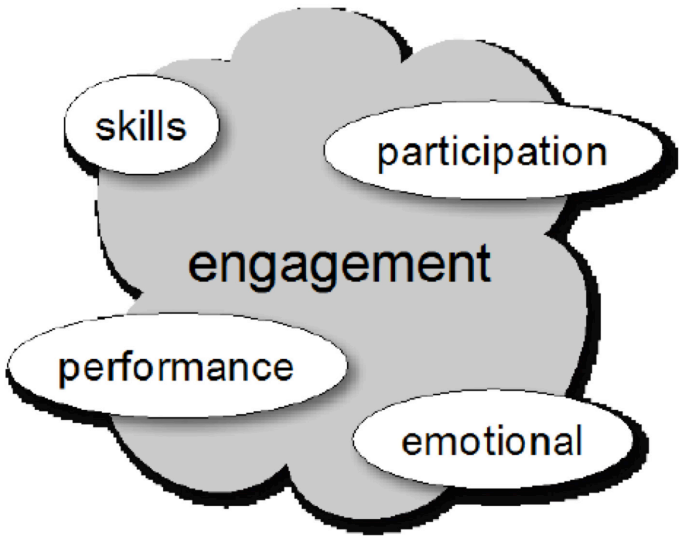
Fig 1 Affective and Behavioural Components of Engagement (Source: Dixson,2015)

The OSE offers three main function: (1) to help design for online course research, (2) To provide assessment for instructor about the degree of student engagement towards the choices of course design being made, (3) to proof teaching efficacy, argument of merits, teaching award, promotion/ permanent position.

However, other instruments have also been developed to measure students engagement including the National Survey of Student Engagement (NSSE), Student Engagement Instrument (SEI), the Engagement versus Disaffection (EvsD), and Motivation Strategies for Learning Questionnaire (MSLQ). However, these instruments uses scales that are limited in reflecting the characteristics in online learning environment (i.e. ODL)(Lee et al, 2019). Therefore, in studying the assessment of ODL, the OSE scales is the most

relevant and reliable approach to measure the students engagement in online learning environment.

KEY LITERATURE FINDING AND DISCUSSION

The emerging trend of adopting ODL in the plight of COVID-19 pandemic has implications on both students and instructors in the higher education. The concept of ODL has started to become imparted in student learning in both synchronous and asynchronous mode of teaching and with little to no preparation on how student engaged and adapt to this style of learning. In the Construction Management Programme offered in UiTM, Shah Alam provides a wide-range of curriculum that emphasise on process, analysis and comprehensive understanding of theories and pratical methods applied in construction and development. The introduction of ODL in construction management programme has potential of paving a way for emerging new IT-driven courses such as Building Information Modelling (BIM), Virtual Reality (VR), Internet of Things (IoT) and Artificial Intelligent (AI). These construction technologies equipped students with multiple IT skills and social skill in working in a digital construction environment. Similarly, the ODL facilitates student learning and engagement through theorectical, practical and assessement to prepare the students with sufficient knowledge and technical skills in their professional career.

In the theorectical aspect of ODL engagement, the university's online learning platfom (i.e Ufuture) provides interface both students and intructors in attending or conducting classes in synchronous and/or asynchronous mode, managing course materials, presentation slides, forum discussion, upload/download assignments, prepare final assessemnts and set up quizzes, tracking learning activities and online attendance. Although the university's online learning platform is useful and handy for both the students and instructors, several challenges were observed that poor internet connection, lack of interaction and participatiom both synchronous and asynchronous , and the lack of eye contact in online presence could jeopardise overall student engagement.

On the other hand, the pratical aspect of ODL engagement involves students gaining their practical experiential learning in construction pratices. The normal practice of traditional labs, using tools and testing materials are

replace with remote or virtual labs through video lab sessions and condensed lab session. The former does not deliver the best outcomes as it does not provide the students with the tangible hands-on interaction, the latter is also more costly and expensive depending the quality and level of expertise that the labs provided. In addition, the use of portable kits is also a practical delivery method, However, is it subjected to whether the students are able to afford the portable kits. Nonetheless, the key challenge with the practical ODL engagement is that student might not have the adequate tangible hands-on experience and skills to fully benefit the learning experience in construction management.

Futhermore, assessements in ODL engagement is crucial to ensure the delivery and quality of the Construction Management Programme. The assessement involves formative (e.g. quizzes, questioning, observation) and summative (e.g. final exams, e-portfolio, final reports) to evaluate student learning and engagement throughout the programme. The purpose of the assessment is to measure the extent to which the students understand and are able to demonstrate cognitive skills and problem-solving skills in the given tasks. This is to ensure that they are on track in learning and aquired the skills in class. Nonetheless, one of the key challenges of setting assessments through ODL is that the online examination may superficially test student knowledge and critical thinking on the subject they studied as mostly would search for answers online without having to be proctored. Eventually, the final grades of students may give a false impression of overall student performance in ODL session as compared to the physical face-to-face class.

Therefore, this study investigates further on student engagement in terms of skills, participation, performance and emotional aspect. The OSE approach introduce the extend to which construction management students engaged in the online learning environment through ODL. The relationship between student engagement and ODL provides opportunity towards understanding better on the effectiveness of online learning environment in higher education.

CONCLUSION

The traditional method of teaching and learning is not the only option in higher education. The advent of technology coupled with the catastrophic global COVID-19 pandemic has catapult the higher education sector into a new method of teaching and learning. The adoption of ODL is forced to be reckon with among students and instructors alike in the enduring the mounting challenges in teaching and learning. Student engagement in ODL has yet to be determined on how student engaged with the teaching materials. The Construction Management Programme offered in UiTM Shah Alam conducts ODL session using the university's online learning platform (i.e. Ufuture). The ODL platforms used by UiTM Shah Alam has an interface for students and instructors to access and manage multiple academic activities synchronously or asynchronously. Conducting ODL also to paves the way for students to uptake the emerging IT-driven courses such as BIM, VR, IoT and AI in construction which lead them to acquire multiple IT skills and social skill in the revolution digital construction environment. Remote labs, condensed labs and portable kits are some of the pratical activities that are feasible for student to learn in ODL session. The end result of student's learning is to be able to evaluated via their formative and summative assessment such as online quizzes, logbook, reports and final examination throughout the ODL process. Therefore, it is crucial to understand the extent to which construction management students are engaged in the ODL lessons. The OSE approach is to be able to capture and understand student active learning, their feeling about learning and the mutual relationship with the learning contents, instructor and their fellow classmates in the aspect of skills, participation performance, and emotional in online learning mode. Future study could explore further by using survey method as to whether they could effectively learn and engaged in the full scale of ODL mode.

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