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39/2023

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The importance of interactions in supporting online study

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Abstract. The social distancing rules during the COVID-19 pandemic have inadvertently changed the activities of teaching and learning- with an unprecedented push to online courses. Educational institutions in developed countries have quickly adapted to the situation by developing their digital platforms to support e-learning. Whereas those in developing countries, particularly Vietnam, found it challenging to respond to the significant increase in online instruction because of lack of equipment and technology gap. This paper aims to examine a blending approach which combines visual technologies and social interactions to support full-time remote education. Qualitative method was employed with the use of thematic analysis to examine respondents' perspectives of their daily online learning. Data was collected through semi-structured interviews of 05 lecturers and 10 undergraduate students in site construction management discipline as they are among groups experiencing seriously negative effects on quality of knowledge exchange which requires amount of time practice on-site or field-laboratory. Activity Theory was employed to guide the data analysis. Four main themes were found in related to "using interactive tools", "developing a learning support community", "defining responsibilities of educators and students" and "governing activities of educators and students" to meet learning objectives within online courses.

Keywords. Activity theory, online courses, interactions, developing countries

1. Introduction

In response to significant demand during lockdown period of COVID-19, many online learning platforms such as Zoom, Google Meet and MS Team have been adopted by universities [1]. These digital platforms are proven to effective to facilitate knowledge-transfer [2]. However, the availability of technology is a necessary but not sufficient condition for sustainable remote learning [3]. For example, the sense of community is lost when students perceived their peers cared less about each other, connected less to others, and supported each other less in the online setup [4]. Also, spending more time on a computer screen may make students felt stress and suffer information overload [5] which results in their distraction by other activities such as using social media [6].

Previous studies mainly focus on personal characteristics of student including self-study ability [7], self-discipline [8] and technical skills [9]. Also, there is an increased number of research on teacher's abilities to manage online courses such as computer literacy [10], online course design [11] and virtual communication skills [12]. The roles of IT infrastructure on students' satisfaction such as online learning platform [13], type of internet connection [14] and learning devices [15] have been widely examined. However, most recent studies have contributed to the discipline of technology-based learning in developed countries [16]; whereas research on forming a more sustainable online-learning environment has been limited [17], particularly in case of developing countries like Vietnam. This paper hence examines alternatives such as adopting non-technology methods together with using affordable technologies (e.g., free educational licenses) to help students engage in a qualified e-learning program irrespective of socio-economic factors.

2. Theoretical framework

This study was informed by Activity Theory (AT) of Engeström [18], [19], [20] as a lens to frame the activity system of implementing construction management online courses (see Figure 1). The theory notes that the work activity is mediated by previous perceptions and behaviours (a historical cultural background of actors) and motivated by objects that take the form of tools as a medium of action to obtain desired outcomes [18]. However, outcomes of an activity system are not always desired results but possibly unexpected results that were transformed from the interactions among the AT system's elements [21]. Traditional AT framework only involved three principal elements that are 'Subjects' (actors engaged in the activity), 'Tools' (instruments used in the activity) and 'Objects' (the targets of the activity) [22]. In his version of AT, Engeström [20] added three more elements that concern with social factors – namely 'Rules' (cultural norms and regulation governing the performance of an activity), 'Community' (environment or social context in which the activity is being carried out) and 'Division of Labour' (hierarchical structure of activity – roles and responsibilities of actors in the activity system).

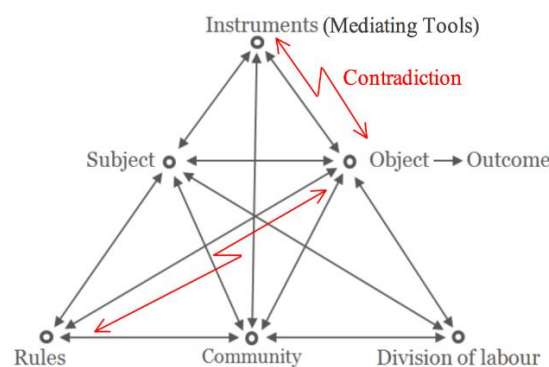


Figure 1. Activity Theory Framework

Another key concept of Engeström's AT is contradiction that occurs when there is tension between elements in an activity system. For example, a contradiction such as a breakdown in the activity where a tool is used inappropriately or in an unanticipated manner [23]. Such contradictions, however, should be seen as an opportunity for change and development rather than problems or conflicts [18]. The identification of contradictions in an

activity system could help actors to focus their efforts on the root causes of tensions to make proper decisions on change [19].

3. Methodology

Qualitative approach was used to develop a comprehensive perspective of educators and students on the emergent transition from face-to-face to online-courses. Data for the research was collected by semi-structured interviews with the support of MS Teams video calls. Respondents include 5 educators and 10 undergraduate students in the civil engineering faculty of a top-ranking technology university in Vietnam (see Table 1). To maintain confidentiality, names of respondents were coded.

The data collection process was initially conducted following the guideline of Activity Theory. That is, using the main themes such as ‘Subjects’, ‘Tools’, ‘Rules’, ‘Community’ and ‘Division of Labour’ to facilitate interview questions. Through the conversations, respondents expressed their concerns, emotions, perspectives, and meanings about main themes which simultaneously were transcribed into raw text files. The transcripts were then iteratively reviewed and analysed to identify recurrent statements, concepts or behaviours of respondents that would derive sub-themes.

Table 1. Profiles of Respondents

Code	Major
Educator #1,2	Architecture
Educator #3	Civil Engineering
Educator #4,5	Project Management
Student #1,2,3	Architecture
Student #4,5,6	Civil Engineering

4. Results

4.1. Enhancing the classroom interaction using educational version of digital tools

4.1.1. BIM facilitates the active learning. The nature of site construction management courses requires field observations to facilitate the understanding of students on construction execution process. However, many educators admitted that the access to the physical site is currently postponed, cancelled or even not available due to the restriction on the number of site-visits complied with social-distance rules (responses from Educator # 1,2,3,4). Through the interviews, it has emerged that a digital tool such as BIM could be used as an alternative approach to support interactive experiences of students. Particularly, a real field trip would be replaced with a virtual field trip simulated by BIM. Rather than watching and writing, students could participate actively in learning through interactive access to information embedded in the BIM model (see Figure 2). Student #1 said that “*the measure and markup tools built-in BIM help us effectively to communicate with other team members about the elevations, zones, and tasks*”. Student #2 gave a supplementary idea that “*watching a video does not give me the full experience as BIM would do. Navigation function of BIM provides a 360-degree immersive walkthrough of the site and thus, enhances collaborative experience for all team members. BIM makes the learning of site inspections easy, fast, and fun*”.

In addition, the findings showed that using BIM is an affordable option for developing countries because students and educators can get free educational access to basic BIM products

and services (e.g.: Autodesk), renewable if they remain eligible (responses from Educator #1,2 and Student #5,6,7,8).

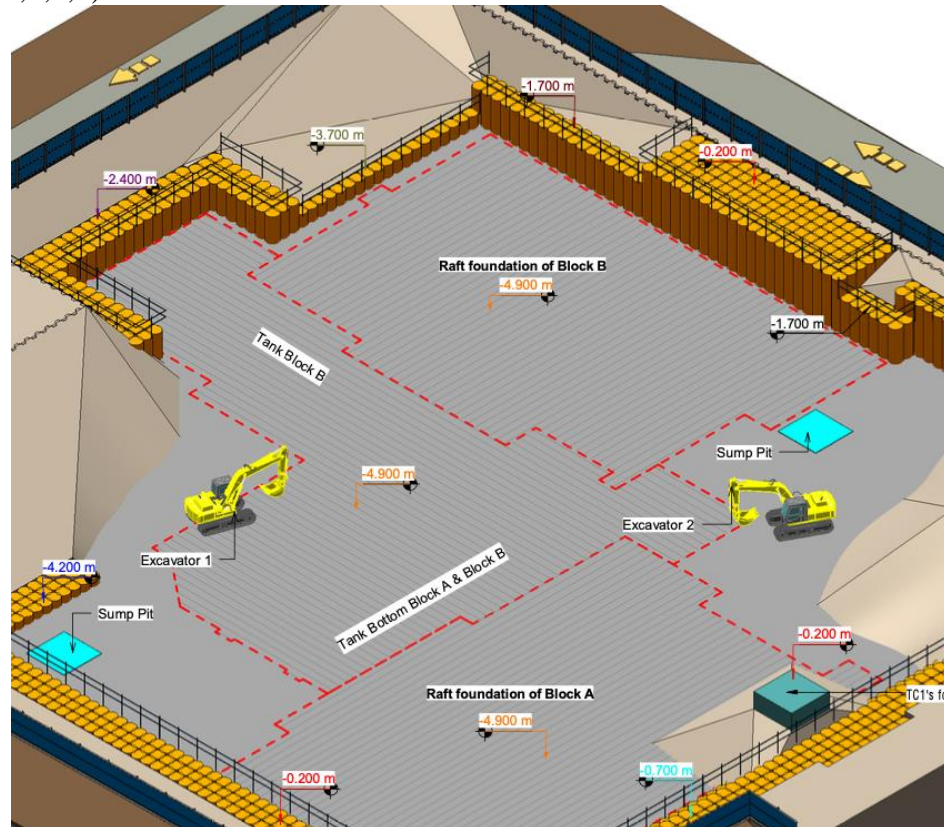


Figure 2. Excavation Method in 3D (shared by Educator #1)

4.1.2. *BIM facilitates collaborative exercises.* The course of construction management involves students from different disciplines such as architecture and civil engineering. The students are required to address the issues related to collaboration scenarios. Educator #1 stated that “*BIM provides a virtual learning environment where students can practice collaborative problem-solving skills through in-class role playing*”. In particular, “*architecture students might better understand the expectation, skills and responsibilities of civil engineer students to streamline the collaborative workflow which would benefit both*” (educator #2). Student #3 experienced that “*conflicts are automatically identified by BIM function of clash detection, thus reducing RFIs and uncertainty among team members*”. Student #4 acknowledged the benefits of the class supported by BIM, saying that “*the reduction in rework could be achieved by early and constantly coordination among participants through a unified data repository model*”.

4.1.3. *BIM supports decision-making through simulation and comparative analysis of results.* A BIM model is made up of numerous built-in parameter (i.e., attribute) objects, for example: materials and dimensions, in which any change in a parameter could change the behaviour of the model. As a result, it found easy for students to experiment various construction methods on BIM model to compare the feasibility and effectiveness among them. Student #5 demonstrated this by saying that “*our team can easily update the data and import changes back into the model. Two versions of the model are then compared to help guide decision-making*”. Student #6 further commented that “*we do not suffer from boring*”.

educational activities anymore as BIM enables us to carry out a lot of exciting virtual testing to test the dynamic behaviour of the technical installations during design”.

4.2. *The need of creating a supportive learning community*

4.2.1. *Students perceive information overload in online learning.* It was found that current program is not intentionally designed for online course. This point was confirmed by educator #3 that *“in a rush to remote learning, I simply transfer face-to-face course into online-materials”*. Educator #4 also acknowledged that *“many of us don’t know how to convert available resource to attractive web-based content. Honestly, we just replicate in-room teaching sessions”*. Consequently, students might feel pressured to manage a large volume of information both on the course website and through computer conferencing. Student #7 said that *“online teaching is both more tiring and more difficult on students’ concentration. I hope my lecturer could split the sessions into shorter ones”*. In addition, student #8 suggested that *“working in a group assignment is preferred to individual one to share a workload”*. According to student #9, *“each team might pick a topic they are interested in learning more about; and then discuss with other teams. This activity enables the cross-knowledge exchange which will free up mental space to think critically about the information they consume”*.

4.2.2. *Proper learner-support involves addressing social aspects.* At a time when social distancing is being implemented, emotional reactions may affect the well-being of the communities where people live and study. Educational institutions should provide students with emotional support to help them manage emotions such as anxiety and confusion. For example, educator #5 has created a specific discussion forum or a private chat beyond the content of their academic courses, explaining that *“this platform allows you to break participants into smaller subgroups to promote both formal and informal discussions, fostering the relationships between participants”*. Educator #1 also demonstrated that *“learners need help and guidance on personal issues, such as difficulties on peer-learning, being ashamed to ask for help and noise distraction at home”*. Student #10 admitted that *“I feel guilty when asking some dumb questions which may slow down the learning process of online class. While in a chat room, I may feel more comfortable because I know that others share the same concern, also leads to people coming together and sharing ideas”*.

Through interviews, it was found that social support is perceived as a key factor affecting the satisfaction of online learners. Student #10 stated that *“I feel more secured to share my interests and experiences with teachers who cares about me, proving me with health assistance or personal study consulting”*. Other student (#8) complimented that *“live chat meetings with my lecturer helps me to navigate ‘new normal’ for online learning transition”*. However, the social supports from educators were found to not properly adapt to student’s requirements. Educator #4 claimed that *“managing social aspects is the part of student services which is not my profession. Besides, it’s impossible to consult students anytime they need because I have teaching-work to fulfil”*. In addition, educator #7 exposed that *“few people know that teaching from home means extra workload due to care responsibilities, such as children staying at home due to the COVID outbreak. So, I can’t remain in touch with students to provide further assistance outside working time”*.

4.3. *Changing roles of participants in online class*

4.3.1. *Educators perceived needs and challenges of cross-teaching.* It was found that close coordination between the educators who teach the courses in a sequence may be required, so they can develop extracurricular materials or propose activities that would help students bridge a gap in a specific topic. Educator #4 declared that *“I believe cross-discipline collaboration and planning is a good way to enrich the students’ experience with the course”*.

material and allows the staff to tailor their instruction to supplement what is going on in other classrooms or subjects". The cross-discipline method is shown to be a creative and inspiring approach to designing online courses. For example, educator #5 argued that *"the cross-teaching is time-saving and productive because I don't need to re-present several basic concepts. Rather, I can reflect on my colleagues' subjects and go deeper in my subject"*. This strategy also benefits students. Educator #2 asserted that *"cross-learning could help students who may not be strong in a particular subject area better engage the material by recalling what they learned (on the subject) in another class"*.

However, at the time of the COVID-19 outbreak, there was less time for properly coordinating the different courses with regards to the types of online teaching activities, exams, and assessments. Educator #1 claimed that *"maintaining online cross-discipline courses proves difficult as it is reported being time-poor and overworked. Lecturers were unable to dedicate the time required to collaborate on shared activities without sufficient funding support from universities"*. Educator #3 commented that *"the adoption of new teaching method requires a long learning curve as many lecturers are used to work in silo teaching"*. In addition, educator #2 experienced the difficulty in *"managing tasks to meet specific goals of each discipline and common goals of the cross-discipline class"*.

4.3.2. *Concerns of students about the fairness of online exams.* Most interviewed students such as student #1,2,3,5,7,9 agreed that online platform better facilitates feedback collection, online reporting, real-time conversations, and schedule management. However, the shift to online learning has seen an increase in academic misconduct such as unethical uses of information technologies in online exams. This might demotivate students from consistently engaging with the program. Student #2 declared that *"why should I put more effort on schoolwork? Everyone else is doing cheating. Cheating today is much handier because of the Internet and smart phone"*.

Other students implied the need for change in assessment and course structure. For example, student #3 said that *"it's not fair if our grades are still adjusted through a few exams such as mid-term and final exam. As such, this situation results in the loss of motivation in online-learning"*. Student #5 commented that *"online cross-disciplines should be designed to enhance brainstorm to solve practical problems. It's also difficult for cheating because this requires higher level of thinking, reading, analysis and synthesis"*. Furthermore, student #1 suggested that *"the achievement of students could be assessed based on their contribution to a cross-discipline project through different project phases and under multi-lecturers' review to ensure fairness"*.

4.4. *Changing roles of participants in online class*

4.4.1. *Setting official rules to maintain focus of students.* To effectively manage online courses, official rules are required- including the need of submitting assessment for grading on the learning system [24]; and meeting the participation of online sessions based on the Institutional regulations [25]. E.g., a student must attend a minimum of 75% of classes to be eligible to sit the final examinations for each course. It was found that adding online homework could increase the average performance of class, particularly students receive grade of C- to B. For example, educator #1,3,4 confirmed that *"our assessment system reported the improvement of overall class performance through additional online homework"*. However, for top students who receive B+ above, the improvement was not significant. This is possibly because *"outstanding outcomes of engineering student require the support of high-tech equipment in school-labs"*- Educator#2,5.

4.4.2. *Setting tacit rules to better manage online class.* Some defined rules of behaviours should be informed to keep participants ‘activities in online class aligned to cultural practices such as respect to others and proper dressing. Some educators such as #1,2,3 commented that “we declare that when a student is speaking, everyone else should mute microphones to avoid background noise”. To reduce the class interruption, “students are advised to post their questions in the chat instead of raising their hands. Then, setting preferred time when educators can go through the questions and answer them, ask students to comment on the questions, or have students ask the questions which others have previously posted”- Educators#3,4.

Although uniforms are not compulsory in online-class, students are asked to dress appropriately to not distract others such as colourful or bed-clothing. Students #1,2,3 admitted that “we sometimes forgot to setup background for screen and unintentionally make other classmates upset to see our messy room and clothing”. In this case, a rule of 5 minutes preparation of looking yourself may help. “People are reminded to look themselves and surroundings before they turn-on screen or join the room. As such, many embarrassing situations can be prevented”- Educators #3,4,5.

5. Conclusion

Table 2 summarises four main themes of the research, namely, “using BIM tools”, “developing a supportive learning community”, “changing roles of teacher-student towards online cross-discipline courses” and “setting rules of online classroom”.

Table 2. Structure of themes

Main themes	Sub-themes
Tools	Using BIM tools (education versions) <ul style="list-style-type: none"> - BIM facilitates the active learning - BIM facilitates the collaborative exercises BIM supports decision-making of students
Community	Developing a supportive learning community <ul style="list-style-type: none"> - Students perceived information overload - Social aspects need to be considered
Division of labour	Changing roles of teachers-students towards online cross-discipline courses <ul style="list-style-type: none"> - Educators perceived needs and challenges of cross-teaching - Concerns of students about the fairness of online exams
Rules	Setting rules of online classroom <ul style="list-style-type: none"> - Official rules such as school regulations - Tacit rules such as students’ behaviours

The research found that the online platform itself is likely less important than teaching methods (whether using technology or not) to help increasing the interactions of participants. It is also recommended that online class is better managed when dividing large group into small groups because this structure improves a focus group discussion, and sense of belong among team-members. Further research may investigate the interactions between small groups, particularly when swapping team-members of each group.

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