Exploring Students’ Interactions While Learning Via an Online Learning Environment

Nur Syamimi Mohd Razali  
Department of Educational Sciences, Mathematics and Creative Multimedia  
Faculty of Education  
Universiti Teknologi Malaysia, 81310 Skudai, Johor  
Malaysia  
nur_soramim87@yahoo.com

Noraffandy Yahaya  
Department of Educational Sciences, Mathematics and Creative Multimedia  
Faculty of Education  
Universiti Teknologi Malaysia, 81310 Skudai, Johor  
Malaysia  
fandymcl@gmail.com

Abstract—This study aims to explore students’ interaction while being engaged in learning activities via their preferred online learning environment. It incorporates three objectives: 1) to identify students’ needs, 2) to design online learning environments and 3) to evaluate students’ interactions. It is also an exploratory study which utilizes the case study method where an actual study is carried out over six weeks, involving 18 students enrolled in the Visual Technology Production course. Quantitative and qualitative data will be gathered from various sources such as interviews, online discussions and log data. The overall study utilizes the Activity-Oriented Design Method as its framework. Meanwhile, data for students’ needs will be collected via focus group interviews based on an Eight-Step Model tool. Then, the data will be analyzed based on the elements stated in the Activity Theory triangular model that include rules, community, tools and division of labour. The relationships between data will then be integrated in online learning environments supported by the Community Knowledge Building Principles. The students’ interactions in an online learning environment will be evaluated based on elements in the Activity Theory. Patterns of interactions will be gathered from the observation of students’ log data, online discussions and interview transcripts. These interaction patterns hence, will facilitate each student in learning via the online learning environment and how a particular pattern may affect their learning objectives. The overall findings may further describe the characteristics and traits of the students and provide useful information to developers, instructors or designers during the design phase of an online learning application based on individual characteristics and contexts.

Keywords—Activity-Oriented Design Method; Activity Theory; online interaction

I. PROBLEM STATEMENT

Teaching and learning via technologically-advanced teaching tools and the internet has become popular nowadays. The introduction of online learning platforms such as the e-learning has reformed the traditional way of teaching. A number of higher learning institutions have started offering online classes to complement their conventional lectures and some even utilized online learning to conduct long-distance education. Through these online classes, learning materials can be delivered electronically, granting learners the flexibility of accessing materials anytime and anywhere [1][2][3].

Online learning environment is an area where online learning process occurs. For instance, an instructor can conduct an online activity that involves learners, their peers and the instructor as well. The interaction between learners and instructor in an online learning environment could make learning more interesting and stimulating, promoting further interaction between the learners and the environment [4].

Interactions in an online learning environment have been widely discussed in literature. However, the terms ‘interactions in online learning’ vary. Moore (1989) for instance, distinguished such interactions into three types: i) learner-learner interaction, ii) learner-content interaction and iii) learner-instructor interaction [5]. An online learning tool such as the Learning Management System (LMS) provides significant tools for interaction to take place during the course. According to [6] & [7], interaction is the heart of an online learning environment. An effective interaction during online learning promises success for learners at the end of the course [8]. In a study conducted by [9], it was concluded that interaction is an important aspect in order to ensure successful learning. Zimmerman has suggested that learners who spent more time interacting with the course content achieve higher grades compared to students who spent less [10].

However, interactions in online learning do not occur on its own. To ensure optimum interaction and hence, success, an instructor should provide an effective online learning environment. Wozniak and Silveira stated that learning activities via a well-structured online learning environment have produced effective learner-learner interactions [11]. Hence, many theories-pedagogical and models-were introduced to design effective online learning environments.

In the literature, various studies have discussed the design phase of an effective online learning environment. Among the popular approaches are Kolb’s [12] and Felder Silverman’s learning styles [13]. Additionally, Analysis, Design, Develop, Implementation and Evaluation (ADDIE) [14] and Analysis, State objectives, Select method, media or material, Utilize media and materials, Requires learners’ participation and Evaluate and revise or also known as ASSURE [15] are also the models used to design an online
learning environment. Although these two models provide analysis phase at the start, they emphasize on target group and tools for learning theories without considering learners’ point of view and their context [16]. In short, the above mentioned models do not emphasize on learners’ needs, requirements and preference in their contexts.

Understanding learners and their contexts are very important in any designing principles, not only in producing the products and courseware, but also in designing an online learning environment. The differing views on this matter prove that the one-size fits all notion for designing an online learning environment is no longer relevant. For instance, students who are computer-literate would be able to use the computer and internet seamlessly compared to the illiterate ones. Thus, an illiterate student has certain requirements that should be considered when designing an online learning tool in order to help them to use the technology better.

Context in this study refers to what takes place in an activity [17]. This means that in order to conduct a successful online activity, students must be placed in their contexts and to date, only a small portion of attention is paid to learners’ requirements, needs and context when designing an online learning environment. Therefore, lecturers and designers should identify the learners’ needs in their context prior to performing an online activity.

This study aims to design an online learning environment by emphasizing the learners’ needs in their context as the main considerations. At the same time, this study will evaluate learning using a designated online learning environment in terms of learners’ way of learning. This kind of investigation allows the researcher to assess how learners learn online and how their learning interaction patterns affect the achievement of their learning objectives.

For this purpose, the researchers will apply the Activity Theory [18] as the main framework in order to design and evaluate the online learning environment. Activity Theory is chosen because it provides strong fundamental and framework to analyze the learner context and at the end apply it to evaluate the learners’ interaction pattern towards the learning objectives. Besides, the researchers will also apply the Community Knowledge Building Principles (CKB) [19] to support the design process.

II. THEORETICAL PERSPECTIVE

In Activity Theory, the unit of analysis is the activity [17]. The key idea of the Activity Theory is the concept of mediation by artefacts [20]. In an activity, each subject connected to the object mediated by the tools, rules, community and division of labour. Eventually, all the action that takes place in particular activity which is to achieve the objective is then transformed into an outcome [18]. In this study, the action means the interaction between the students and the artefacts outlined by the Activity Theory.

III. RESEARCH QUESTIONS

The aim of this study is to explore students’ interaction while being engaged in learning activities in their preferred online learning environment. Hence, the following research questions are addressed:

1) What are the students’ contextual characteristics needed to design an online learning environment?

2) What are the nature of students interaction while situated in their preferred online learning environment such as:
   a) Interaction between students and tools?
   b) Interaction between students and community?
   c) Interaction between students and rules?
   d) Interaction between students and division of labour?

3) How the interaction patterns affect the students learning outcomes?

IV. RESEARCH DESIGN

This study is exploratory in nature that involves quantitative and qualitative data collection and case study method. Data will be gathered from multiple resources such as interviews, log data record, online discussion transcripts as well as students’ marks. For research question 1, focus group interviews will be conducted on students and lecturers to gather data about the students’ contextual characteristics and needs. The interview transcript will then, be analyzed via content analysis to classify them into related category. Data from log data record and online discussion transcripts will be analyzed to obtain frequency and to observe their navigation pattern in order to get their interaction patterns in their online learning environment. In addition, one-to-one interviews will also be conducted and analyzed to get further insights and support the findings.

V. RESEARCH FRAMEWORK

This study utilizes the Activity-Oriented Design Method (AODM) as a framework-a method pioneered by Mwanza [21]. This design method rooted from the Activity Theory, which was testified to be suitable for studies that include designing and evaluation phases [21] [22] [23].

TABLE I. AODM SIX STAGES [21]

<table>
<thead>
<tr>
<th>Stages</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Interpret the situation being examined in terms of Activity Theory</td>
</tr>
<tr>
<td>2</td>
<td>Model the situation being examined</td>
</tr>
<tr>
<td>3</td>
<td>Decompose the situation</td>
</tr>
<tr>
<td>4</td>
<td>Generate research questions</td>
</tr>
<tr>
<td>5</td>
<td>Conduct a detailed investigation</td>
</tr>
<tr>
<td>6</td>
<td>Interpret and communicate findings</td>
</tr>
</tbody>
</table>

AODM consists of six stages of implementation and four tools. The six stages are depicted in Table 1 and the four
tools can be applied iteratively in the six stages processes. The four tools are named as Tool 1: The Eight-Step Model, Tool 2: Activity Notation, Tool 3: Generating Sub Activity-Oriented Research Questions and Tool 4: Mapping Operational Research. AODM is chosen because of its organized stages that would facilitate the researchers from the initial data collection until data analysis, as well as reporting findings and discussion.

VI. DATA COLLECTION
The data collection process is divided into two parts: the initial data and the actual study.
A. Part 1: Gathering Initial Data
The purpose of the initial data is to gather students’ needs in an online learning environment. The respondents for this stage consist of students and lecturers. Focus group interviews technique will be used towards the students. Eleven students are selected to become the respondents of the interview session. Each group consists of five and six students respectively. At the same time, to get further insight about the students’ needs, two experienced lecturers will be interviewed using a one-to-one technique. For this purpose, two sets of interview questions are prepared specifically for students and lecturers.

Then, an online learning environment will be designed and created by referring to the data gathered in the initial stage. The data are in the form of students’ needs and preferences. The Learning Management System (MOODLE) is used as the platform to design the online learning environment.

B. Part 2: Gathering Data for Actual Study
Subsequently, the actual study will be carried out in six weeks, which will involve eighteen post graduate students enrolled in the Visual Technology Production course. They will be divided into five groups, consist of three to four students respectively. Each group will receive an assignment regarding their course which requires them to apply their knowledge in order to complete the task. The students then will be required to use the online learning environment designed earlier (which is known as e-learning) as the activity and learning platform. They will then, work together in the e-learning and will be asked to use all the tools in the e-learning including the forum and resources. At the end of this task, each group must present their work and submit their products to the lecturer. Marks will be given to their work based on the required criteria by the lecturer. Within the six weeks, the students will be monitored and assisted by the researchers and their lecturer.

Log data tracking and discussion transcripts will be gathered from the online learning environment LMS (Learning Management System) whereas, qualitative data will be obtained from the interview. A few students will be selected at the end of this course to be interviewed. The purpose of the interview is to get in-depth information about their activity, which could assist the researcher in supporting the findings about their interactions and effect to their learning outcomes.

VII. DATA ANALYSIS
Data analysis also will be separated into two parts which are analyzing initial data and analyzing data for actual study
A. Part 1: Analyzing Initial Data
The data collection in the initial stage aims to answer the first research question. For this purpose, Stage 1 and 2 in AODM (refer to TABLE I) will be utilized. The interview transcripts from student focus group interviews will be analyzed using content analysis. The same procedure will be applied to the one-to-one interview transcripts with the lecturers. Before content analysis is done, the raw interview transcripts will be transcribed by two transcribers. At this stage, researcher will utilize AODM Tool 1: Eight-Step Model in order to examine students’ needs and preferences before being coded based on the elements in the Activity Theory triangular model, which are tools, rules, community and division of labour. The needs and preferences data with the combination of Community Knowledge Building principle will then be used to design an online learning environment by using the MOODLE.

B. Part 2: Analyzing Data for Actual Study
The actual study aims to answer the second and third research questions which are to explore students’ interaction pattern and how it affects students’ learning. The method to analyze the finding is the case study. Since this study utilizes AODM, researcher uses Stage 3 – 6 (refer to TABLE I) in order to conduct the case study. It includes utilization of AODM tools; Tool 2 - Activity Notation and Tool 3 - Generating Sub Activity-Oriented Research Questions. By using this tool, the complex situation of an activity will be decomposed into simpler sub-activities so that the investigation process becomes structural and organized. Sub-activities notation will be in form of students’ interaction between Tools, Rules, Community and Division of Labour. For the case study purpose, log data from the MOODLE will be examined thoroughly to track the students’ navigation in the online learning.

‘Student-Tools interaction’ is the interaction between students and the tools provided in the online learning platform. The tools in this study can be the forum, the chat, helpline from the tutor and course content. From here, researcher will investigate how students use such tools during their activity in order to achieve their learning objectives. Activity Theory stated that human activities are mediated. Therefore tools can be the artefacts that mediate students in online learning.

‘Rules’ in this study refer to the course content. In other words, resources provided in the online learning environment in this study become the rules. Course content or learning materials can lecture notes, additional notes,
glossaries and other related content. Student-Rules interaction on the other hand, examines how the students interact with or utilize the course content in the online learning environment. It also might be what is their learning approach that students apply when interact with the online course content.

‘Community’ refers to all people involved in the online learning activities. In this study, online learning activity will involve student and their groups, lecturer and an assistant. To analyze the Student-Community interaction, the researchers will examine students’ usage of communication tools and their postings.

‘Division of Labour’ can be referred as roles of the participants in an activity [24]. In this study, Student-Division of Labour interaction refers to how students play their roles during the online learning activities. It might be their inquiry towards their peers as well as their tutor and lecturer.

At the end, researcher will relate all the interaction patterns and examine on how such patterns affect the students’ learning in order to achieve learning objective through online activity. In Activity Theory, students work towards achieving their objectives. For this study purpose, students’ object will be their end products of the activity. Marks will be given by course lecturer according to the certain criteria.

From this study, relationship between interaction patterns can determine how the students learn in online learning. Thus, students’ characteristics and traits during learning in an online learning environment might be obtained. To report the findings and discussion, researcher will use the AODM Tool 4 - Mapping Operational Research.

VIII. SIGNIFICANCE OF THE STUDY

This study emphasizes on designing an online learning environment based on students’ needs and preferences in their contexts. The importance of such study makes us realize that an online learning environment does not fit all students at the same time because of the variety of student’s background and learning styles. The result of this study will help us understand how each particular student learns in their preferred online learning environment. This enables us to recognize and identify students’ characteristics while being engaged in an online learning environment as well as the effect of the interaction patterns towards their learning outcome. This research is significant to course lecturer and course design, especially when it comes to designing an online learning environment or learning applications.

XI. EXPECTED FINDINGS

Every person is different in their manner of studying. The same goes to online learning learners who probably come from different backgrounds and learning styles. They might have difficulties while engaging in an online learning environment due to these stated constraints. Hence, this study is expected to come out with students’ characteristics and traits, particularly on how they learn in order to achieve their learning outcomes. The findings will help course lecturers and designers to design the online learning environment or learning application based on students characteristics obtained from the study.

ACKNOWLEDGEMENT

The authors would like to thank the UniversitiTeknologi Malaysia (UTM) and Ministry of Education (MoE) for their support in making this project possible. This work was supported by the Research University Grant [Q.J130000.2631.08J33] initiated by UTM and MoE.

REFERENCES


