EXPLORATION OF LEARNER-CONTENT INTERACTION USING INTERACTIVE DIGITAL MATERIALS

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Abstract

Interaction is believed to be the most important aspect in learning. Moore (1989) proposed that there are three types of interaction in learning context, which are learner-content, learner-instructor, or learner-learner interactions. Many researches have been conducted in relation to the learner-instructors and learner-peer interactions. However, that is not the case with learner-content interaction. In accordance with this, a project was designed to explore the learner-content interaction in Universitas Terbuka (Indonesia Open University). The study data was based on the use of interactive digital materials (IDM) of two (Module 5 and 6) out of nine course modules of a master level course titled Design and Model of Innovative and Interactive Instructions. The findings of the study revealed that most students interact with the content not in the sequence suggested by the content designer, and students seemed to interact with the content in no 'particular' pattern. Further information from students confirmed that they read randomly based on the page/s that could easily be opened when they accessed the IDM. Data also reveals that the frequency and duration on students interacting with content in the IDM was low. This low use was due to the slow internet connection that made it difficult for students to navigate the content within the IDM. The influence of internet connection quality to the learner-content interaction confirms the importance of learner-interface interaction argued by Mutalib et al. (2016).

Keywords: learner-content interaction, learning interactions, online learning, distance.

1 INTRODUCTION

Interaction is believed to be the most important aspect in learning. Moore (1989) proposed that there are three types of interaction in learning context, which are learner-content, learner-instructor, or learner-learner interactions. The interaction between learner and instructor is communication between learners and the instructor (which can be lecturer, tutor) in a course, while interaction among the learners is communication between the learner and his/her peers in the same course. In online courses, these interactions take place using both synchronous (video conferencing, online chat sessions) and asynchronous (e-mail, discussion boards) methods (Kearsley in Zimmerman, 2012). While the interaction between learner and learning content is the process in which learners do the actual studying (reading, making highlights, doing self-tests, etc.) in their attempt to comprehend the learning content itself.

Current technologies provide a wide variety of media alternatives for creating content for learner interaction. Clark (2000) suggested that any evaluation of learner-content interaction must recognize that every distance education context consists of two distinct levels of learner-content interaction, the first dealing with attributes of the media that support the interaction and the second with the "technology" of the learning or instructional design. This is in line with Anderson (2003b) who argued that with the availability of numerous resources which are rapidly increasing, it was now possible for learners to interact with more variety of learning resources beyond text-based materials. The latest educational technology combined with OERs have especially helped distance education providers to design their curriculum and learning materials in the best pedagogically possible to help learners obtain their learning goals. Thus, it is logical to expect learners to have increased and enriched learner-content interaction. Therefore, with the advancement in technology, Anderson (2003a) argued that the learner-learner and learner-teacher interactions can be emerged in an enhanced learner-content interaction. It is important to note also, that if all interactions in online learning happen within an online learning environment, the easiness of the online environment will also affect the quality of the interactions and student's learning experiences.

Many researches have been conducted in relation to the learner-instructors and learner-peer interactions. However, that is not the case with learner-content interaction and it is partly due to the broad term of content (Zimmerman, 2012), and can also include a wide range of activities depending

on course structure, design, and format, as well as the difficulty in measuring the actual 'happening' of the interaction. However, many educators believed that learner-content interaction is the fundamental and most important one because it is where the learning process takes place (Zimmerman, 2012).

In accordance with this, a project was designed to explore the learner-content interaction in Universitas Terbuka (Indonesia Open University). The project started by developing digital content to facilitate learner-content interaction based on the existing printed materials, which is termed as Interactive Digital Materials (IDM). The completed IDM was then provided to the students and their use of the provided materials were recorded electronically (by the Learning Management System's statistical analytics). This paper reports the findings of the study based on the real use of IDM by the students in the second semester of 2018/2019.

2   METHODOLOGY

This is a field experiment research where data was collected from the real learners' learning experience using the interactive digital materials. The 'intervention' in this research is the provision of the IDMs. The interactive digital learning materials were developed based on the existing printed-based learning materials. The conversion into the digital format includes enrichment with videos, pictures, and highlight of materials.

The experiment was conducted in the second year of study, where the materials were used in the second semester of 2018/2019. The provision of the IDMs was done through the online tutorials activities. The data on the pattern of materials' use was collected electronically from learners' learning log recorded automatically within the tutorial's Learning Management System. Interactive digital materials for this project is defined as digital materials that are enriched with videos to replace the still picture (when possible) and with interactive quizzes; and that will also allow learners to highlight, make notes, and underline directly on

This study used the course of MPDR 5203 (*Design and Model of Innovative and Interactive Instructions* or Disain dan Model Pembelajaran Inovatif dan Interaktif) as the subject of the R&D. The selected course consists of nice (9) modules and was offered as a course within the Master Program of Basic Education. The IDMs of both modules were delivered through the online tutorial's LMS using SCORM format to allow the study to track students' learning activity electronically, and thus becoming the learner-content interaction data.

The online tutorials are compulsory so that every student must register and participate in the online tutorials. The tutorial is set up as a class-type online learning where students are grouped into tutorial classes consisting of maximum of 20 students, and the tutorial is designed to be deployed within 12 weeks/sessions.

Students taking this course in Semester 2018/2019 had access to the digitized materials as well as to the printed version. Therefore, students may have learner-content interaction both 'conventionally' and electronically. Data to probe students' perception about the interactive digital materials and their experiences were gathered through group discussion with students of UPBJJ Semarang, Central Java.

Data collected was analyzed in terms of sequence of reviewing the materials in each and both modules, time spent in the selected segment of the materials as well as in completing the self-tests.

MPDR 5203 is a master level course offered in the second semester of the Master of Basic Education Program. The course is a three-credit course and titled "Design and Model of Interactive and Innovative Learning' (Desain dan Model Pembelajaran Interaktif dan Inovatif). The course was emphasized on skills for developing learning designs in accordance with the characteristics of basic education. The course content of the course is conveyed through nine modules. The part of course which materials were converted into the interactive digital format for this study are Module 5 and Modul 6: "Experimental-based Learning Models" and "Information and Communication Technology (ICT) for Learning, Learning through Multimedia, and Learning through Internet". Modul 5 consists of two Learning Activities (chapters) and Modul 6 consists of 3 Learning Activities.

3 RESULTS

3.1 The Number of Users of IDM

The students involved in this study were students of Universitas Terbuka's Master Program in Basic Education who registered for the course of MPDR5203 ("Design and Model of Interactive and Innovative Learning' or Desain dan Model Pembelajaran Interaktif dan Inovatif) in the semester of 2018/2019.2. The total number of students are 266 and they are located in 11 cities in 9 provinces. All students are obliged to join the online tutorials and are grouped into 9 online tutorial classes each consisting of maximum of 30 students.

Table 1 shows that not all students taking the course took use of the IDM. Only 148 students actually opened the IDM (58%). As known, the IDM was provided to the students as another format of the printed version of the learning materials. In other words, students had the choice to read the content through either the printed version, the IDM version, or both. In addition, the use of IDM in the online tutorials was not made compulsory, and it was only strongly encouraged by the tutors. Among those who opened the IDM, 97 students (66%) are female and 96% are student teachers. Further data show that 121 out of the 142 teachers (85%) are those with civil servant status (although not necessarily teaching at public schools). Geographically, student readers were spread in 10 Regional Offices in 8 provinces as shown in Table 1.

Table 1. Students' geographical locations.

Province	Regional Office/City	Number of Students	
		In the Course	*Opened the IDM*
North Sumatera	MEDAN	7	1
Riau	PEKANBARU	26	15
DKI Jakarta	JAKARTA	51	32
Banten	SERANG	30	18
Central Java	PURWOKERTO	61	40
Central Java	SEMARANG	26	14
West Kalimantan	PONTIANAK	15	4
East Java	MALANG	17	9
East Java	JEMBER	18	11
Bali	DENPASAR	13	4
West Java	BOGOR	2	0
TOTAL		266	148

3.2 Reading Frequency, Time, and Duration

The total number of students recorded to have opened the IDM of both Module 5 and Module 6 is 148 (Table 1). Among those students however, Table 2 shows that only 63 students (43%) read both Module 5 and Module 6; while 112 students opened only Module 5 and 99 students opened only Module 6. Further data also show, that 26 out of the 112 (23%) Module 5 readers and 20 out of the 99 (20%) Module 6 readers were non-starters, which means that they only opened the IDM up to the cover page and closed it again without further reading and or browsing the materials.

Table 2. Numbers of Readers.

Number of Students	Module 5	Module 6
Opened the IDM	112	99
Non-Starters	26	20
Readers	86	79

Table 3 presents the frequency and the time of the students opened the IDM. As shown by the table, most students (96%) opened the IDM one time only (one login), only four students opened it in two login times, and none of them opened it more than two login times. The table also shows that 108 out of 112 students (87%) of Module 5 readers read the IDM in the morning time, 43 students of which did it after midnight (between 00:00-06:00 o'clock) and 51 students did it between 6:00 -12:00 o'clock. On the other hand, the reading time of Module 6 shows that the number of students who read in the AM and PM time are about equal. It is interesting to note that while none of the students opened Module 5 in late evening time (after 18:00 o'clock), most (33%) students opened Module 6 in late evening after 18:00 to 24:00 o'clock. And, like in Module 5, most students (80%) also opened the IDM in one login time only.

Table 3. Frequency and time of reading IDM.

Time of Reading	Number of Students	
	Module 5	Module 6
1x Login		
▪ 00:00-06:00	43	13
▪ >06.00-12:00	51	28
▪ >12:00-18:00	14	9
▪ >18:00-24:00	-	30
Total	108	80
2 x Login		
▪ EAM & LAM		4
▪ EAM & LPM		1
▪ LAM & EPM		3
▪ EPM & LPM		2
▪ EPM & EAM	2	2
▪ LPM & LPM	2	2
▪ LPM & LAM		2
Total	4	16
3 x Login		
EAM& LPM& LAM		1
Total		1
4x Login		
EAM&LAM&EPM&LPM		1
Total		1
Not Known		1
Grand Total	112	99

With regards to the duration of time students spent in reading the modules, Table 4 presents the data on both Module 5 and Module 6.

Table 4. Duration of reading activity.

Duration	Module 5	Module 6
Total Duration	0 – 01:13:12	0 – 5:19:12
Average Duration of starters	00:12:47	00:32:29
More than 30 minutes	13 students	23 students
More than 1 hours	4 students	12 students

Data records of Module 5 reading activity show that the duration of time students spent in reading Module 5 ranges from zero (0) to 1 hours 13 minutes and 12 seconds; while in reading Module 6 ranges from zero (0) to 5 hours 19 minutes and 12 seconds. The increase in time duration from Module 5 to Module 6 most likely due to the fact that Module 6 contains 3 LAs while Module 5 only contains 2 LAs (therefore less pages). The average time students spent in reading the modules are very short. On average, students spent only about 12 minutes in reading Module 5 and only a little

over half an hour in reading Module 6. The table also shows that in Module 5, only 13 students spent more than 30 minutes, and only 4 students spent more than one hour. Similarly, only 23 students spent more than 30 minutes and only 12 students spent more than one hour in reading Module 6. The students who spent more than one hour reading Module 5 and those reading Module 6 are different students, except for one student who spent around one hour in each Module. Those reading time durations indicate that students might still prefer reading the printed version of the Modules, and thus spent only a little time reading the IDM. Another reason for not spending a significant time in reading IDM might be related to the slow internet connection as mentioned by students 14 out of 26 students who were invited into the FGD. They said that they encountered technical difficulties in navigating the IDM due to slow internet connection. Some students even mentioned that some pages (perhaps those with images) could not open or too slow to open (buffering for a long time).

3.3   Video Viewers

As described previously, one of the features in IDM is video programs that are inserted in every LA. The videos were selected based on their relevance with the LA's substance, and taken from YouTube (with permission of the creators). Most videos are in English and therefore was given subtitles in Bahasa Indonesia. Table 5 shows that the numbers of video viewing are only 23 in Module 5 and 34 in Module 6. Most video viewers only viewed one video, but there are two students viewed both vides placed in LA1 and LA2 of Module 5. Meanwhile, one student viewed Videos in LA1 and LA2 and five students viewed videos in LA2 and LA5, and none of the students viewed all three videos in Module 6. The total number of students who watched videos in Module 5 is 21 and in Module 6 is 28. It is therefore obvious that not all the readers watched the provided videos.

Table 5. Number of video viewers and viewing.

Video	Number of Videos Viewing	
	Module 5	Module 6
Video in LA 1	21	9
Video in LA 2	2	20
Video in LA 3	-	5
Total	23	34
Number of Students Viewed Videos	21	28
Percentage out of IDM Readers	25%	35%

3.4   Reading Patterns

The IDM was developed using the standardized template that outlines every Module in certain sequence of activities. Every module consists of a cover, introduction, learning activities (LA), and references. Each LA covers the main content, exercises, summary, and self-formative test. Each module can have two (the minimum) or more LAs (chapters). The template was designed to be self-instructional materials to guide students learn the content in a systematic way. In other words, the students are expected to read through the materials in accordance with the designed sequence, which is starting from the Introduction, and then the learning activities one by one starting from the first learning activity (the first chapter). Within any particular LA, students are also expected to start by reading the explanation of concepts and perhaps some examples/case studies, doing the exercise, reading the summary, then completing the self-test before going into the next LA. This way, students are envisioned to have a systematic interaction with the content. Table 6 presents the recorded pattern of students' interactions with the content within the IDM.

Table 6. Reading pattern.

Number of Students who read in:	Module 5 (2LAs)	Module 6 (3 LAs)
The expected sequence up to the first LA	58 (67%)	38 (48%)
The expected sequence up to the last LA	24 (28%)	7 (1%)
No particular sequence	32 (37%)	39 (49%)

As shown by Table 6, not all students read the IDM following the expected sequence. In fact, only 28% (Module 5) and 1% (Module 6) of student readers followed the structured sequence up until the end of the modules. This shows that students have various preferences in reading the provided materials for different reasons related to their individual learning styles, which are not probed in this study. The difference reading styles also shown by the data that only 71 of the 86 students read the Introduction of Module 5 right after opening the cover (Table 7); and only 44 of the 79 students read the Introduction of Module 6 right after opening the cover (Table 8). The rest of the students seem to start the reading and studying at various different sections of the modules.

Table 7. Pattern of the First 20 Reading Activities in Module 5.

MODUL 5	Number of Students by Sequence of Reading Activity Occurrences																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cover	92		1	1			1	1	2	1	1	1							1	
Introduction	1	71	4			2	1	1	1	1		1	1							1
Explanation LA 1	9	14	76	71	74	69	67	62	52	49	46	44	47	32	40	36	33	11	2	2
Video 1				1					3	1	1	1		5						
Exercise 1				1	1						1	1	1	1	1	2	2	19	8	
Summary 1					1	1						2			1	1	1	1	14	10
Self-Test 1					1	1							1	1		1	1	4	1	13
Explanation LA 2					1		1	2	1	2	3	2		3	2	3	4	4	6	7
Video 2													2	7						
Exercise 2																				1
Summary 2																			1	
Self-Test 2																		1		
References		1		2											1	1				
TOTAL	102	86	81	76	77	73	71	66	59	54	52	52	52	49	45	44	41	40	36	35
Missing	10	26	31	36	35	39	41	46	53	58	60	60	60	63	67	68	71	72	76	77

Table 7 further layouts the pattern of students' first 20 (out of 40) reading activities when they interacted with content of Module 5. As shown, there are 10 students who only opened the IDM but not even stayed to go through the cover page and there are 26 students who stop opening the IDM at the cover page (defined as non-starters in Table 2). The table also depicts that the number of students who continued reading the IDM decreases consistently. It started with 10 non-starters, but the number of students who stop reading after two (2) recorded reading occurrences increases to 31, then those who stop reading after three (3) recorded reading occurrences increases to 36, and those who stop reading after 19 recorded reading occurrences increases to 77. This means that the proportion of students who read Module 5 up to 20th reading occurrences was only about 31% (35 out of 112). In fact, data shows that only one (1) students did the reading up to the maximum record (the 40th) of reading activities. Furthermore, students spent their time the most at the Learning Activity (LA1 to be precise) and very few was recorded to open the pages of Exercises, Summaries, and Self-tests. Finally, regarding students' interaction with the video materials, only 12 viewing on Video 1 and 7 viewing on Video 2 were recorded.

Table 8. Pattern of the first 20 reading activities in module 6.

MODUL 6	Number of Students by Sequence of Reading Activity Occurrences																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cover	58	3	4			1	2	1	3		3	1		1	3		1	1		
Introduction	8	44	5	2	1	1			1	2		2		1		3				
Explanation LA 1	15	14	52	52	41	40	36	34	25	21	14	11	11	7	6	5	8	5	5	
Video 1	2		2		2	2	2		1											
Exercise 1	5	7		4	2			4		2	9	3	2	3	1	4				
Summary 1		1	1	3	5	5	2		3	1	1	7	6	2	1	1	2		1	
Self-Test 1			1			1	5			4	4	4	8	5	2		1	1		
Explanation LA 2	5	6	6	6	7	7	8	9	9	4	6	9	8	14	14	14	13	10	9	8
Video 2		1	1	2	4	4	3	2	1					1				1		1
Exercise 2								1		2	1		2		4			1	1	2
Summary 2						1		1	1	1	1	1		1		3			1	1
Self-Test 2							1		2			1			4		3			1
Explanation LA 3			3	2				2		3		2	1					5	4	6
Video 3														1						
Exercise 3	1	1		1	1	1								1		2			1	1
Summary 3	1	1				1	1			1				1					2	2
Self-Test 3		1	1				1	1						1		1	1		1	
References	1			1	1	1				1	1						1	1	1	1
TOTAL	96	79	76	73	65	65	61	55	46	41	41	41	40	36	35	32	30	26	26	23
Missing	3	20	23	26	34	34	38	44	53	58	58	58	59	63	64	67	69	73	73	76

A for the reading activity of Module 6, Table 8 layouts the pattern of students' first 20 (out of 45) reading activities when they interacted with content of Module 6. As shown, there are 3 students who only opened the IDM but not even stayed to go through the cover page and there are 20 students who stop opening the IDM at the cover page (defined as non-starters in Table 4). As in Module 5, Table 8 also depicts that the number of students who continued reading Module 6 decreases consistently. It started with 3 non-starters, but the number of students who stop reading after two (2) recorded reading occurrences increases to 23, then those who stop reading after three (3) recorded reading occurrences increases to 26, and those who stop reading after 19 recorded reading occurrences increases to 76. This means that the proportion of students who read Module 6 up to 20th reading occurrences was only about 23% (23 out of 99). In fact, data shows that only one (1) students did the reading up to the maximum record (the 45th) of reading activities. Furthermore, students spent their time the most at the Learning Activity (LA1 and LA2 only to be precise) and very few was recorded to open the pages of Exercises, Summaries, and Self-tests. Similar to Module 5, students' interaction with the video materials in Module 6 was also low, and even only 1 viewing on Video 3 was recorded.

If we sum up all activities in each Learning Activity (explanation, video, exercise, summary, and self-test), the pattern of reading activities can be presented as shown in Table 9. As seen in the table, most students opened the IDM with the cover, then continued to the Introduction part, then to the first Learning Activity (highlighted). Furthermore, we can also see more vividly from Table 9 that students who read through the whole document of IDM is much fewer than those who stop reading in the first LA. Table 9 supports the earlier statements about the consistent decrease in the number of students who did the reading until the end of reading occurrences.

Table 9. Summary of reading pattern of module 5 and module 6.

SEQUENCE	Number of Students by Sequence of Reading Activity Occurrences																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
MODUL 5																				
cover	92		1	1			1	1	2	1	1	1							1	
Introduction	1	71	4			2	1	1	1	1		1	1							1
Total LA1	9	14	76	73	76	71	68	62	55	50	48	48	49	39	42	40	37	35	25	25
Total LA2					1		1	2	1	2	3	2	2	10	2	3	4	5	7	8
References		1		2											1	1				
MODUL 6																				
cover	58	3	4			1	2	1	3		3	1		1	3		1	1		
Introduction	8	44	5	2	1	1			1	2		2		1		3				
Total LA1	22	22	56	59	50	48	45	38	29	28	28	25	27	17	10	10	11	6	6	0
Total LA2	5	7	7	8	12	12	12	13	13	7	9	10	10	15	19	18	17	12	12	13
Total LA3	2	3	4	3	1	2	2	3	0	4	0	2	3	2	3	1	0	6	7	9
References	1		1	1	1						1	1					1	1	1	1

4   CONCLUSIONS

Interactions are very important and central to students' learning experiences. There are at least three type of interactions in learning, which are learner-learner, learner-instructor, and learner-content interactions (Moore,1989; Anderson and Garrison, 1998, Anderson, 2003b) that would facilitate the social, teaching, and cognitive presence (Garrison, D. R., Anderson, T., & Archer, W., 2000; Saadatmand et al., 2017). Within an online learning environment, the quality of those interactions is influenced by the learner-interface and learner-self interactions (Mutalib et al., 2016). The easiness of the technology used as the learning environment will affect the learning experience of the students.

As many researches have been conducted in relation to the learner-learner and learner-instructor interactions, this study focused on investigating the learner-content interaction within an online learning environment. The approached taken to gather data on this learner-content interaction was through students' behavior in reading the content formatted as interactive digital materials (IDM). The IDM, as described previously, was delivered to students in SCORM format, where students can read it in accordance with their sequence preferences, can make notes, can highlight, can watch video, and can browse related external references to the content through google and Wikipedia. Similar Zimmerman (2012) approach, the reading behavior recorded included the frequency and time of reading, the amount of time that learners spent, and most importantly the reading pattern.

Based on the analytic data, this study found that apparently only 58% of students were taking use of the provided IDM, and those who 'read' (opened) the IDM were not spending too much time on it either (average of 38 minutes for Module 5 and 87 minutes for Module 6). These might be due to the facts that students also have access to the printed version of the materials, and reading the IDM was not compulsory. The non-compulsory nature of reading the IDM combined with some difficulties related to internet connection as the reasons for not reading the IDM were confirmed by students during the Focus Group Discussion (FGD) in Semarang. Twelve out of 26 students (46%) who came to the FGD admitted that they did not open the IDM because they did not have internet connection, and that because they said they read the course content from the printed version of the materials. The other 14 students who claimed to open the IDM also mentioned that they found technical difficulties in navigating the IDM due to slow internet connection. The technical difficulties affected the speed of navigating from page to page of the IDM, opening the video, as well as browsing the external references. These problems, they said, have discouraged them to continue reading the IDM until the end. Only two students claimed that they did not have any problem at all regarding internet connection and thus could read the IDM smoothly. Those two students were apparently using personal computer at their homes when they access the IDM, while the rest was using their smartphone that are usually accessing internet within limited 'data quota'. The students who were recorded to have read the modules for hours (Table 6) were probably accessing the IDM through personal computers as the two students at the FGD.

The university has long developed and deployed an application for accessing the online tutorials through mobile gadgets (smartphones and tablets) called 'UTOnline' that is downloadable through Google Play and Apple Store. Have the students downloaded the application they could download the

IDM and accessed it offline. However, assuming that students already know and use the application (because they are not new students), this information was not provided specifically in this study, which apparently should have.

Regarding reading pattern, data show that most students interact with the content not in the sequence suggested by the IDM format. Only 28% of Module 5 readers and 1% Module 6 readers were following the suggested content structure until the last Learning Activity of the modules (Table 7); and 37% of Module 5 readers and even 49% of Module 6 readers interact with the content in no 'particular' sequence whatsoever. These reading behavior patterns recorded by the LMS analytic however are in line with what the invited students claimed during the FGD. They said that they read randomly based on the page/s that could easily be opened when they accessed the IDM. Students mentioned that some pages (perhaps those with images) could not open or too slow to open so that they had to skip and jumped into a different page. Based on this information, it is therefore difficult to make any conclusion on whether the reading patterns represent their learning styles or merely a result of technical difficulties.

The low use of IDM found in this study also confirm the importance of learner-interface interaction as suggested by Mutalib et al. (2016). Because the technology was not conducive to provide seamless access to the content, students could not enjoy the learning experiences when they tried to have a learner-content interaction through the IDM. This confirms that in online learning, the technology dimension of the learning plays a pivotal role in establishing the other types of interactions, and thus affecting student's satisfaction in their learning experiences.

Based on the findings of this study, which show the importance of good internet connection for effective use of IDM, it is deemed necessary to do further research by eliminating the obstacles that arise in this study. To optimally record students' interaction with the content in the IDM, it would probably be better if the IDM is delivered to students in a portable device so that they can access in off-line. Therefore, further study to explore students' – content interaction may need to consider this latter approach.

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