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Media and Information Literacy of the Students Who Learn with a Digital Learning Environment Based on Constructivist Theory

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Abstract: Technology alone cannot bridge the digital divide between and within countries. Knowledge societies ultimately depend on people's access to media and information and their ability to locate, evaluate and use information effectively. Media and Information Literacy (MIL) represents essential competencies and skills to equip citizens in the 21st century with the abilities to engage with media and information systems effectively and develop critical thinking and life-long learning skills to socialize and become active citizens. This study was conducted in the high school, Khon Kaen, Thailand and investigated students' attitudes and media and information literacy while working on a problem-based learning that was embedded within a digital learning environment based on constructivist. We studied the impact of learning with digital learning environment on high school students. Students worked in groups and created solution task with digital and media technology. From a survey questionnaire, the students showed positive attitudes towards the task with respect to their learning motivation and understanding, and skills. By incorporating multi-learning task into a constructivist learning environment, students learned to access, evaluate and use media and information, as well as to experience critical-thinking, creative, presentation and communication skills. The results from a MIL competencies test showed that the students who learn with a digital learning environment to enhance media and information literacy can access information effectively and efficiently, evaluates information critically and competently, and applies and uses information accurately and creatively. Our findings provide strong support and encouragement for Thai educators to incorporate media and information literacy task and constructivist learning into the classrooms for the enhancement of teaching and learning in 21st century.

Keywords: Media and information literacy, digital learning environment, constructivist

1. Introduction

The empowerment of human resources through the media and information literacy is an important prerequisite for the promotion of access to information and knowledge equally. Which is the basis for everyday life faced by the media and information in a wide range of changes and advances in all aspects of the local problems. Media and information literacy as key principles for freedom of opinion and access to information. This will enable people to understand the role of media and information sources, and assess critically about content. As well as the decisions of the users and producers of media content and information. The definition of such skills it can be seen that the media and information literacy skills are not only searching for information or access to information that is found in today's youth only. However, skills assessment, interpretation and implementation of critical information to meet their requirements and needs. However, today's youth is the lack of skills in this field. It can be seen from the results of the Programme for International Student Assessment (PISA), with three areas of knowledge include reading literacy, mathematical literacy and scientific literacy. Reading literacy is an assessment of the ability to understand what has been read, the ability to be used, to reflect the opinions of their own, and have a passion and commitment to reading for developing their knowledge and potential, and to participate in society. Such issues are discussed in

accordance with MIL above. PISA tests from 2012 showed that the average reading scores of students in Thailand is 441 points. Scores of students Thailand is lower than other countries such as Shanghai - China (570) Hong Kong - China (545), Singapore (542), Japan (538), Korea (536), Finland (524), Ireland (523), Chinese Taipei (523.), Canada (523). Student Thailand has been classified as a Class testing is very low, therefore, need to be further developed and enhanced its ability to display the skills, knowledge, media and information literacy student Thailand.

However, pedagogy corresponding to the learning management and training in MIL is constructivist theory. Constructivism focuses on learning by giving students the knowledge itself, on how to manage learning for the students to face the problem in real time, teachers need to have integration between science and teaching methods, content, and skills needed. Including the provision of learning resources, tools, and guidance to help resolve issues for students, called "learning environment". In education and learning environment in the current integration of both a science and teaching methods, content, skills required, and the media, or technology that provides a little more. In the current study about designing and developing the learning environment with the integration of both pedagogy and teaching methods, content, skills required, and MIL that provides a little more. Especially in Thailand, most of which focus on specific skills or develop content without specific content knowledge, but no integrating the skills needed in a mission to learn. As a result, students cannot link the knowledge and skills for solving problems or for the operation. Moreover, the lack of appropriate technology tools used to develop the skills and knowledge.

For that reason, it is essential to develop a framework to develop a learning environment that promotes media and information literacy skills of students at the secondary level, the age group with the recognition and exposure to the media and information on a wide range of both positive and negative. Moreover, it will be the basis for learning in vocational or university level, as well as for troubleshooting in work and lifelong learning. By integrating pedagogies and teaching methods, content, skills required, and MIL, or the appropriate technology, which will be a guide for learning to develop students to be able to live for the world in the present day are. a wide range of information and technological progress has happily.

2. Constructivist Learning Environments

Constructivist learning environments: Case studies in instructional design, Wilson (1996) defines a constructivist learning environment as: “a place where learners may work together and support each other as they use a variety of tools and information resources in their guided pursuit of learning goals and problem-solving activities”. He emphasizes learning environments as opposed to 'instructional' environments in order to promote “a more flexible idea of learning", one which emphasizes "meaningful, authentic activities that help the learner to construct understandings and develop skills relevant to problem solving”.

To create a learning environment in this study, the researchers created the designing framework is based on constructivist theory, which has seven components: problem based, information resource, scaffolding, collaboration tools, MIL tools, coaching, and related case. Figure 1 showed the digital learning environment based on constructivist theory.

Figure 1. The main page of the digital learning environment based on constructivist theory

The problem based is designed to motivate students to achieve a balanced intellectual concepts of Piaget (1958) believes that learning takes place when students were motivated by the problem to a cognitive conflict or disequilibrium. When students' disequilibrium, the students will try to restructure its intellectual equilibrium and when the student can enter into a state of balance, intellectual or create new knowledge in them, means that learners achieve learning. Problem based include situations where a problem is occurring on a daily basis and the learning task that encourages students to practice media and information literacy. Figure 2 showed the sample problem based in the digital learning environment.

Figure 2. The problem based in the digital learning environment

The information resource created by the support of the restructuring of students, having been made to disequilibrium of the concepts of the cognitive constructivist theory. The information resource contains content that is useful for solving a problem and the learning task. The content of the information resource covers that require students to learn, and design theory using SOI Model. The scaffolding designed based on the concept of the zone of proximal development to the base for students who have problems or questions in the learning task. The collaboration tools are designed based on concepts of Social constructivist, believe that social interaction will promote the expansion of knowledge. The collaboration tools include technologies that provide for students and the students can communicate with each other easily.

MIL tools is provided for students in the training and skills about the media and information, moreover, has the tools provided in the relevant media and information technology as tools for accessing, organizing information, communication and creation. The related case was based on the constructivist theory, which will help students learn methods, procedures, and principles to solve problems. The related case to contain the situation, the problem is with the nature of the problem coincided with situations where students assigned to resolve. The coaching element is established based on the concept of social constructivist, which stated that the role of the teacher in the classroom of a learning environment by providing advice, counseling, and guidance, which called for the coach.

3. Methodology and Target Group

Target Group

The study consists of 48 students in grade 10 (m=21 and f=27), Khon Kaen, Thailand. All students must be enrolled in science courses is mandatory. The purpose of this course is that students have an understanding of the concept of science around them. Moreover, access to search and build scientific knowledge in their daily lives.

Methodology

At the end of research, students were given a thirty-item survey, to measure their attitudes towards learning with a digital learning environment based on constructivist theory in their learning process, to fill out. The survey was adapted from Irani (1998). The items measured on a 5-point Likert scale, and with 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 =Agree and 5 = Strongly Agree. The survey aimed to gauge their motivation, critical-thinking and creativity skills, teamwork, presentation and communication skills, and overall attitudes towards learning with digital learning environment. However, media and information literacy of student were evaluated by MIL Test was adapted from

Global Media and Information Literacy Assessment Framework (UNESCO, 2013). Open-ended questions and tasks solutions was added tests to measure literacy. However, the learning environment that use for student, we designed and constructed based on constructivist theory which was synthesised in designing framework. The digital learning environment was validated by expert review and student opinion survey.

4. Results

Students' attitudes towards learning with a digital learning environment based on constructivist

The collected data were analysed with SPSS, and yielded a Cronbach Alpha coefficient of 0.9106, which satisfies the requirement of survey reliability. Results showed that students had very positive attitudes towards the learning task and their use of multimedia technology in this learning environment. From their responses from the survey, open-ended questions and the interviews, students' perceptions toward this study can be categorized into the following areas:

- Learning motivation
- Increased understanding and learning of subject domain
- Skills and real-world relevance

Tables 1-3 present the results of the questionnaire in the 3 areas, with the overall means (m) ranked for each items in these 3 areas, the percentage of responses (p) by students according to the 5-point Likert scale (i.e., SA = Strongly Agree, A= Agree, U = Undecided, D = Disagree, and SDA = Strongly Disagree) as well as their respective standard deviations (SD). In addition, student comments and feedback were also obtained from their journal reports and from the survey's open-ended question section. Students provided feedback on their learning process as a result of doing this learning with digital learning environment, which are also show in Tables 1-3 accordingly.

Table 1: Results for students' learning motivation

Learning motivation Items in the survey	mean	SA (p)	A (p)	U (p)	D (p)	SDA (p)	SD
1. Motivated to do learning tasks	4.25	30.2	64.2	5.7	0	0	0.55
2. Learning tasks made me want to do my best	4.25	32.1	60.4	7.5	0	0	0.59
3. I found the learning tasks to be challenging yet stimulating to do	4.19	30.2	58.5	11.3	0	0	0.62
4. I enjoyed working on a learning tasks like this	4.08	24.5	62.3	11.3	0	1.9	0.73
5. This course has given me confidence in my newly acquired skills	3.91	18.9	56.6	20.8	3.8	0	0.74
6. I was able to maintain contact with my lecturer	3.74	7.5	62.3	26.4	3.8	0	0.65
7. I am very satisfied with my contribution to the learning tasks	3.68	17.0	41.5	34.0	7.5	0	0.85
Students' comments on Learning Motivation: 1. "Very motivated. This subject is very fun. I get the chance to come out with my own ideas and creation on an application." 2. "I feel motivated from that cause I can learn some new skills that I can't learn from my faculty". 3. "I am so happy and motivated when do this task."							

From Table 1, it can be seen that students' motivation levels were high and their interest in doing the learning tasks was very much enhanced, as the three highest ranked items in the survey were motivation items. In particular, students felt highly motivated in completing their tasks, and reported that the task encouraged them to work hard. Most students (94.3%) reported favourable motivation levels (m=4.25) and 92.5% of students reporting that the learning tasks made them do their best (m=4.25), making these two items the highest ranking items in the survey. They also indicated that although the learning tasks was challenging, it provided much stimulation in their learning process -- 88.7% reporting in favour of the item (m = 4.19). Almost everyone in the class reported that they enjoyed working on such a learning tasks (m = 4.08, p = 98.1), whereas 75.5% of students reported

that doing the learning tasks has given them confidence in the skills which they had acquired in the process (m = 3.91), and 69.8% were able to maintain contact with their lecturer during the learning tasks conducted period (m = 3.74). And as such, 92.5% of students reported that they were, on the overall, satisfied with their contribution to the task (m = 3.66). Support for this favourable report can also be seen in their comments and feedback. Students reported that they enjoyed doing the learning tasks as it made them feel very motivated and satisfied with their contributions. Students reported in their journals (Table 1) that they were motivated because the learning task was something that was relevant to them and elicited their curiosity. They also expressed excitement with the innovative way information was presented as they used multimedia technologies to create something that was digital and interactive.

For increased understanding and learning of subject domain**,** this construct was incorporated to gauge students' perceptions on whether doing the task resulted in an increased level of understanding for the subject matter and on their own learning process (Table 2).

Table 2: Results for students' understanding of the subject domain

Increased understanding Items in the survey	mean	SA (%)	A (%)	U (%)	D (%)	SDA (%)	SD
1. The task enhanced my learning of interactive multimedia	4.13	26.4	62.3	9.4	1.9	0	0.65
2. The task increased my understanding on how to manage and develop task solution	4.13	24.5	67.9	3.8	3.8	0	0.65
3. I am now a better learner	4.02	20.8	64.2	11.3	0	0	0.69
Students' comments on Increased Understanding: 1. "Before doing this task, I do not know much about Nai Rudee…but after working on this topic for past four months, I learnt Nai Rudee in detail. Now I am able to explain about Nai Rudee to my other friends". 2. "I believe my understanding towards media and information research has vastly improved after undergoing the task given to us." 3. "It helps me more understand the subjects in science."							

Results in Table 2 showed that students were favourable toward this construct. In the survey, students reported that in terms of their overall understanding of the task's objective, 88.7% of students reported that the learning task enhanced their learning of science (m = 4.13) and that the learning task increased their understanding of how to manage and develop and MI application (m = 4.13, p = 92.5). They also reported that they have now become better learners, (m=4.02, p=84.9). Again, these perceptions are well supported by their comments and feedback, which showed that students did perceive themselves to have increased understanding of the subject matter from the task. Many reported that they now understood what it meant to develop a solution and that hands-on experience made them understand solve problem that use MIL as well as on their chosen topic.

For skills and real-world relevance, this construct was to gauge students' attitudes and perceptions on their acquisition and experience with skills such as critical-thinking and creativity skills, teamwork and group skills, communication and presentation skills, multimedia technology skills, and the ability to properly apply them (Table 3).

Results from their survey shed more light and support for this construct, as, in terms of acquired skills, 88.7% of students reported that they were now able to apply their skills in a more effective manner on future learning tasks (m = 4.15), making it the highest ranking item in this category. They also reported being able to analyse, synthesise, and evaluate information (m = 4.08, p = 88.7). Critical-thinking skills were also enhanced, as 79.2% of students reported that they were now able to think critically about developing solution of task, (m=3.94), as were presentation and communications skills, as 67.9% of students reported that the task allowed them to improve their presentation skills (m = 3.72), and presenting their solution well using multimedia (m=3.89, p=75.5). Students also showed increased perception of the relationship between their work and the work in real-life situations. 84.9% of students reported that after completing their solution, they were now able to see the relevance between the learning tasks and the course, with real-world situations (m = 4.04), allowing them to develop skills needed in the real-world (m = 3.98, p = 81.1).

Table 3: Results for students' skills acquisition

Skills and real-world relevance Items in the survey	mean	SA (%)	A (%)	U (%)	D (%)	SDA (%)	SD
1. I am now able to apply my skills in a more effective manner on future tasks	4.15	26.4	2.3	1.3	0	0	0.60
2. The task allowed me to analyse, synthesise and evaluate information	4.08	18.9	69.8	1.3	0	0	0.55
3. I saw the relevance between the course and real world situations	4.04	22.6	2.3	1.3	3.8	0	0.71
4.This task allows me to develop skills needed in the real-world	3.98	18.9	2.3	17.0	1.9	0	0.66
5. I am now able to think critically about developing solution of task	3.94	17.0	62.3	18.9	1.9	0	0.66
6. We were able to present our task well using multimedia	3.89	18.9	56.6	0.8	1.9	1.9	0.80
7. The task allowed me to develop and improve my presentation skills	3.72	7.5	60.4	28.3	3.8	0	0.66
N=48							
Students' comments on Skills and Real-World Relevance: 1. "…from the experience of working with my group members, I am prepared to face different people I might meet in the near future." 2. "I get to know more about how to develop a good task in the future as if I have the chances to take on the multimedia task." 3. "I learnt a lot of skills and knowledge…which enable me to understand and may apply to my future as well."							

Students' comments and feedback further provided support to the results and showed that they were able to acquire and experience these skills and that they saw the relevance of these skills with that needed in the real-world. They also reported that the acquisition and experience of these skills increased their confidence levels in solving problem- and team-related problems in the future (Table 3).

Students' media and information literacy that learning with a digital learning environment based on constructivist

The analysis of data from the MIL Test by interpreting and average. The results shown that, more than 70.83 percent of students can access information effectively and efficiently, evaluates information critically and competently, and applies/uses information accurately and creatively. Table 4 shows the number and percentage of students that can be done as indicators of MIL.

Table 4: Number and percentage of students that can be done as indicators of MIL

Indicators of MIL	Students that can be done	
	Number	Percentage
1. The student accesses information effectively and efficiently;		
Definition and articulation of media and information need	46	95.83
Location and retrieval of media and information	43	89.58
2. The user evaluates information critically and competently;		
Assessment of media and information	40	83.33
Organization of media and information	39	81.25
3. The user applies/uses information accurately and creatively;		
Creation of knowledge information	35	72.92
Communication and ethical use and media and information	34	70.83

Table 4. summarizes the results of that; 95.83% of students can definition and articulation of media and information need, 89.58% can location and retrieval of media and information, 83.33% assessment of media and information, and 81.25% can organization of media and information. Meanwhile, 72.92% of students can creation of knowledge information and 70.83% can communication and ethical use and media and information.

5. Discussion

The results show strong support for using a multimedia project in a constructivist-based learning environment. From the survey and their feedback, students' demonstrated positive attitudes and perceptions to developing a multimedia project within this learning environment. They were able to reveal that they had acquired several key constructivist learning skills through doing the learning task, which would enable them to become better skilled workers in the new Century.

Specifically, the development of this multimedia project within this learning environment allowed students to experience the following:

1) In this constructivist-based learning environment using multimedia, it can be seen that students experienced high levels of motivation and self-esteem when doing the multimedia project as shown in their comments and survey results, and is in line with Reeves' (1998) perspective that, "multimedia can stimulate more than one sense at a time, and in doing so, may be more attention-getting and attention-holding.". More importantly, it enhanced their confidence levels in their newly acquired skills, knowing that they can use the same skills in their future undertakings.
2) Students showed increased understanding of the topic and being able to see the relevance of the project to real-life situations. This falls within the realm of authentic learning (Herrington et. al, 2004).
3) Digital and multimedia technology was successfully integrated in this constructivist learning environment as an enabler and catalyst to support the students in successfully using the tools to demonstrate their creativity and MIL. By incorporating multimedia into this constructivist learning environment via their multimedia project, students were able to design using multimedia and experience critical-thinking, creative, presentation and communication skills, as well as enhancing their motivation and understanding levels. Using various combinations of media elements to illustrate their messages in the application gave students the opportunity to think critically about their messages and the flexibility to present them. Using Web communication tools also gave them the opportunity to solve group meeting problems and to conduct any meetings or discussions, and any exchange of ideas amongst themselves whenever they had scheduling conflicts for face-to-face meetings.
4) Results of this research study provide good evidence for using multimedia technology and a project-based learning approach within a constructivist learning environment, as adapted from Jonassen's (1999) framework, for Thai educators in tertiary education, who want more flexible options in their classroom teaching methods, and to inculcate their students with better real-world skills. More research can be done, however, in investigating further the role of multimedia in motivating students, and the group dynamics within such a learning environment.

6. Conclusion

The study was thus successful in providing students with the experience in access / retrieval of information, evaluation / understanding information, use / create / communicate information and problem-solving, critical-thinking and creativity skills, communication and reflection, and in improving their overall understanding of the project's objective, as students reported satisfaction with their contributions. They also became active participants in their learning process. The problem base and learning task also allowed students to become more independent in their thinking and as a whole, enabled them to improve their learning process.

Adapting Jonassen's (1999) proposition for building a constructivist learning environment using technology in this classroom environment created a digital learning environment where students were able to solve a problem, via the problem base and learning task, that was authentic and relevant to them, and allowed them to collaborate and work together as a team to complete the task, and to claim responsibility and ownership of their development process. This digital technology learning environment allowed students to experience a constructivist-based approach in their learning process where they became active participants and constructed their own knowledge. Therefore, this research study has shown that incorporating digital technology into a constructivist learning environment can lead to innovative teaching and learning methods for the improvement of classroom learning.

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