

AOT- Learning Analytics of Digital Learning in Printing Production Course for Education Technology to Increase Creative Thinking in Thailand

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Abstract

The purpose of this study was to create the digital learning by Digital Learning Analytics' method as the appropriated tool to develop the creative thinking in Thai students. The study consists of five procedures which are, first, studying the documents, principles, theories and the researches which related to the digital learning, learning analytics and creative thinking. Second, designing the digital learning combine with the learning analytics to develop creative thinking. Third, creating and developing Digital Learning Analytics. Fourth, applying Digital Learning Analytics to printing product course for education technology. Fifth, evaluating the using of Digital Learning Analytics and Creative Thinking test. The sampling group of this study is 30 Thai students, who have basic technology skills. The result of this purposive sampling was analysed by these following methods, Mean Method and Satisfactory Evaluation. Finally, I present the using of Digital Learning Analytics, which consisted of 7 steps 1. Import Data 2. Identify problem 3. Plan the concept 4. Create a prototype 5. Utilize by user 6. Assessment process 7. Modify the route. Those results will be evaluated by the experts in Digital Learning Analytics and also the creative thinking Thai students will be evaluated as well.

1. Introduction

Nowadays, the world society is stepping into the digital society in which people communicate via the network, access information with just a click of a finger. Technology and computers have been developed and used in both the business world and personal use or for other purposes as quickly and widely as needed. Resulting in the amount of information that newly created in each day. These data are a valuable knowledge resource if we can use it. (Yaowaluk and Sophon, 2561) Information and activities through the online world is increasing every year. Data from Thailand Internet User Profile 2018 from the Electronic Transactions Development Agency (ETDA) found that Thailand has more than 57 million internet users, for social media regularly reaches 51 million. About 55.56 million people are mobile phone users, and about 46 million social media users use its through smartphones. Thai people use the internet for nearly 10 hours a day on workdays/school days and 11 hours on holidays. It is also found that the behavior of Thais who use the internet via smart phones include talking 77%, watching videos 75%, playing games 66%, searching routes 64% and making financial transactions 56% (Rohan, 2018). This dramatic increase in usage affects thinking, life, and information understanding bring data together from various media and the ability to analyse the relationships of that data, enable us to improve business operations, sales and marketing, able to take advantage of competitors or create business opportunities. As can be seen from the data collected to lead to the analysis of solutions. For example, from the article "Deciphering the unstoppable Netflix and the role of Big Data" analyze that Netflix has achieved rapid success by collecting audience data in terms of viewing history, pressing stop playback, used devices, search, rating, etc. to create Big Data which analyzed from past movies selection that which movies viewers would like to watch next. Then presenting more directly or closely to the preferences and tastes of consumers, affect the experience and satisfaction. It results in more than 137 million subscriptions (data at the end of 2018). These analyzed data is not only used to increase business opportunities but also educational has uses data collection for analysis in learning.

Learning analytics is the process of measuring, collecting, analyzing and reporting learner results for the purpose of understanding the learners. Both problems and factors that promote learners learn in order to manage the learning environment to maximize results. (Jaitip, 2016) The software features of the data analysis software set include Content analysis, Discourse analytics, Social learning analytics, Disposition analytics by analyzing various data from the collected database, it is an important part of the operation. If there is enough data and covering relevant factors, it will help the result of the analysis to be precise and accurate. Study analysis procedure begins with bringing the information that needs to be done in a form that is ready to be processed by using technology or the set of instructions and the model created in order to use the information that has been analyzed and translated or interpreted according to the context and the learning environment. It is a support for solving problems and increasing the efficiency of digital learners.

Learning in the digital age is a process or method that a person uses to create meaning from information, environment, social stimuli that are received sensory, resulting in knowledge, skills and attitudes when systematically developed, it can be predicted to be effective at full capacity (Jaitip, 2016) that is suitable for the era. Presented on the platform to reach more young people with the internet and portable communication devices like smartphones being an important factor in the digital age. People are able to use technology aggressively and perform a variety of activities within their fast communicating all the time. There are many ways to access information, sharing, exchanging ideas, freedom to express ideas and express themselves through social media and also self-learning at anytime, anywhere through resources on a vast network. Learning activities has changed not only in the classroom but also an access the classroom freely in anytime and anywhere which using digital technology as a creator (Sungkawadee & Keawurai, 2017). Resulting in methods of accessing students' knowledge to use technology as a tool and develop oneself to create knowledges and skills that are continuous and sustainable. Digital tools for learning mean software and platforms for teaching and learning as well as text, images, audio, video, and programs for editing the digital content, working together and sharing resources with others to communicate knowledge (Interactive Teaching in Languages with Technology, 2017)

Creativity is the ability of the brain to think far and wide. Many aspects of its create new ideas which are differ from before. It is the ability to see the various relationships around, learn to understand until the reaction occur to the imaginative thought, which is an important aspect of creativity, leads to the creation of new things to solve problems which will require integration from all experience and knowledge (Charnnarong, 2003) By educational in Thailand at present, students are encouraged to create creative ideas that rely on technology and the internet to apply their competencies in accordance with Thailand 4.0 policy. Thailand educational institutions must integrate creative development with the methods and learning activities of the digital age that can access information in anywhere, anytime, as well as support lifelong learning in various courses therefore, focuses on the students to use creative thinking processes to solve learning problems

Learning in printing production courses focuses on students to be able to produce publications. Not only understand the principles of production but the design of publications is also an important part. The design of print media requires principles of font or text design, material, illustration, free space and other components for the publication to meet the objectives, target group and communicate effectively

2. Research Objectives

The objectives of this study was to create the digital learning by Digital Learning Analytics' method as the appropriated tool to develop the creative thinking in Thai students.

3. Sample size 30 undergraduate students in Educational Technology department

4. Research Methodology

4.1 Studying the documents, principles, theories and the researches which related to the digital learning, learning analytics and creative thinking.

4.2 designing the digital learning combine with the learning analytics to develop creative thinking by divided into the following steps

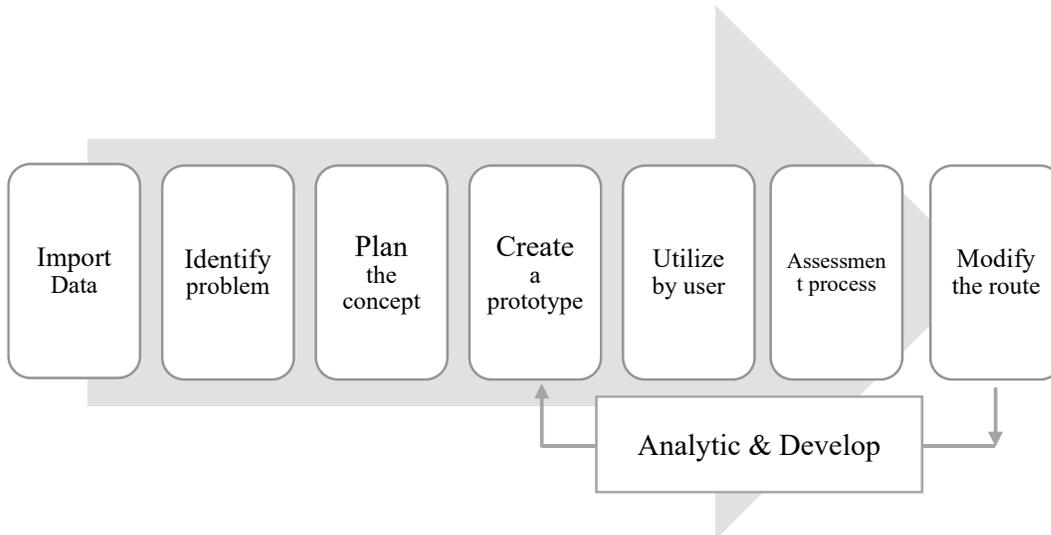
1. Defining the conceptual framework from the data obtained from the analysis in step 1 and create it in the format
2. Designing content and learning activities in the printing production course by using the creative development process, the SCAMPER model, consists of Substitute, Combine, Adapt, Magnify, or Minimize or Modify, Put to Other Uses, Eliminate, Reverse or Rearrange (Sirichai, 2015)
3. Designing Digital Learning in learning. It can be divided according to usage of the teaching and learning activities into 5 categories (Hart, 2017; Poore, 2013), including 1) Teaching management tools 2) Content development tools 3) Website resource tools 4) Social tools and 5) Personal tools and job development (Kobsuk, 2018)
4. Designing evaluation form by using the Reisman Diagnostic Creativity Assessment (RDCA) which is a test that is built on from the Torrance Tests of Creative Thinking (TTCT), the most popular test for measuring creativity that was developed in the Thai version (Naruertep & Charun, 2018) RDCA can measure 11 elements of creativity including originality, fluency, flexibility, thoughtful thinking, vague solutions, resistant of premature closure, independent thinking, convergent thinking, risk taking, motivation, and external motivation.
5. Designing analytics for learning analytics by selecting the type of discourse analytics. This type of analysis is to store meaningful information in the communication interaction of learners with Digital Learning tools in order to correct and improve efficiency of learners' creativity

4.3 Creating and developing Digital Learning Analytics. Develop tools for online teaching and learning via the internet (LMS) with Moodle software, which is a software for creating web-based tutorials. By determining to have a lesson management system which supports 3 user groups that are administrators, teachers, and learners. Provide an effective web-based learning environment. This system was developed based on Software Open source. Then create lessons in the Printing Production for education and communication course. According to the following learning units

- 4.3.1. Printing History
 - 1.1 European print production technology
 - 1.2 Asian publishing production technology
- 4.3.2. Educational publications and principles of educational publications design
- 4.3.3. Printing systems and materials related to printing
- 4.3.4. Applying graphic design principles to print design
- 4.3.5. Newspaper publications
- 4.3.6. Magazine and periodical publications
- 4.3.7. Book publications
- 4.3.8. Specialized publications (brochures, small books, booklets, flyers, posters-newsletters)
- 4.3.9. Specialized publications (flyers, posters-newsletters and other specialized publications)
- 4.3.10. Principles of designing original publications
 - 10.1. Publishing publication
 - 10.2. Principles and concepts of electronic publications design
- 4.3.11. Electronic publications design

4.4 Applying Digital Learning Analytics to printing product course for education technology.

4.5 Evaluating the using of Digital Learning Analytics and Creative Thinking test. Assess satisfaction and assess the creative ability of learners before-after using Learning Management System Implementation (LMS)



Model of Learning Analytics of Digital Learning in Printing Production course for Education Technology to increase Creative thinking in Thailand

Table: 1. Model of Learning Analytics of Digital Learning in Printing Production course for Education Technology to increase Creative thinking in Thailand

Model	Detail	Digital Tools	Creative Thinking	Productive
1. Import Data	Data Import - It is the import of data by testing the creativity of students.	Quizletstudy Google Form	SCAMPER creative development process	Online pre-test
2. Identify problem	Problem Analysis - From the test scores, it was found that the creative scores in	Giving Opinion Reflecting Knowledge and	Substitute Combine Adapt	Discussion of messages or ideas for

Model	Detail	Digital Tools	Creative Thinking	Productive
	_____ is still missing, so promotion must be carried out	Creating links in the group area	Magnify or Minimize or Modify Put to Other Uses	working in the classroom
3. Plan the concept	Action Planning - Use the analyzed problems to design the problem solving plan by brainstorming - Using the creative promotion process	Create mind maps by using the online graphic map tool.	Eliminate Reverse or Rearrange	Mind map creation Work outline
4. Create a prototype	Create templates / Create media / Create online activities to promote creative	- Online document sharing tool - Tools that help to display the idea of a work that can use text, images, video, audio - Learning Management System (LMS) tools - Classroom website		Learning Management System
5. Utilize by user	Bring the created template to be used by relevant parties such as students and teachers.	LMS Google classroom		Printing Product - Name card - Brochures - Cut out - Newspaper
6. Assessment process	Evaluation - Take post-test to measure creativity - Inspect workpieces from online activities to check creativity during school - Analyze statistics of each type of media access in order to examine access behavior, frequency level of media access that affect creativity	Assess in LMS Statistical Analysis Website		Online post-test
7. Modify the route	- Bring the results from the evaluation in all 3 dimensions to analyze and find solutions for the highest learning efficiency - Making factual solutions - Go back to the template drafting process to improve	- Online document sharing tool - Tools that help to display the idea of a work that can use text, images, video, audio - Learning Management System (LMS) tools - Classroom website		Statistical analysis from attendance and activities

5. Analysis and Discussion

Assessing the suitability of the formats Learning Analytics of Digital Learning in Printing Production course for Education Technology to increase Creative thinking in Thailand by applying the evaluation form to 5 educational technology experts

Table 1. Results of data analysis of the suitability of the overall model

Evaluation List	Experts		Level of opinion
	\bar{x}	S.D.	High
History of model development	4.40	0.70	High
Process of format	4.50	0.53	High
Results of the format	4.40	0.70	High
Functional Use	4.50	0.53	High
Reflection of the format	4.50	0.53	High
Total Average	4.46	0.60	High

From Table 1, the results of the data analysis on the suitability of the formats Learning Analytics of Digital Learning in Printing Production course for Education Technology to increase Creative thinking in Thailand found that the evaluation results were at a high level in all items. The process of the format, the results of the format and the suitability of the implementation of the format have the same mean score and standard deviation which is 4.50 and 0.53 respectively.

The results of the comparison of the average score of the creative thinking before and after learning of the experimental group of 30 students

Table 2. The results of the comparison of the average score of the creative thinking scores before and after learning of the experimental group.

Components of Creativity	Level of Creativity number (%)	
	Before	after
Originality	66.25	89.34
Flexibility	45.56	78.43
Thoughtful Thinking	50.14	82.27
Vague Solutions	33.64	80.65
Resistant of Premature Closure	64.33	75.89
Independent Thinking	56.09	81.23
Convergent Thinking	45.05	88.19
Risk Taking,	34.78	86.92
Motivation	48.63	79.54
External Motivation	53.25	70.08

From Table 2, the comparison of the average scores of the pre-test and post-test of the experimental group showed that there was an increase in all components of creativity. The pre-test, Vague Solutions has the smallest mean score and Originality has the highest mean score. After experiment, the researcher found that Originality has the highest mean, and Resistant of Premature Closure has the smallest mean.

Analysis of the interaction of students' interaction with Digital Learning tools in learning activities through Learning Management System (LMS)

Table 3. Analyzing the interaction of learners' communication with Digital Learning tools

Digital Learning tools	Average time spent (%)	Number of students using (%)
PDF file	15	5
Video Instruction	45	35
Social Media	40	60

From Table 3, it is found that the analysis of the interaction of students' communication with Digital Learning tools, The tools that students using the most is Social Media, followed by Video Instruction and PDF file. Moreover, spending time in learning with Digital Learning tools found that students spend the most time on Social Media, followed by Video Instruction and PDF file.

6. Discussion and Conclusion

From the study, development in the format of Learning Analytics of Digital Learning in Printing Production course for Education Technology to increase Creative thinking in Thailand consisted of 7 steps 1. Import Data 2. Identify problem 3. Plan the concept 4. Create a prototype 5. Utilize by user 6. Assessment process 7. Modify the route, when using that format for data analysis from the suitability evaluation form of the format that has been evaluated by experts. It found that the suitability of the overall format has a high level. The average value is 4.46 and the standard deviation is 0.60 which shows that this format is suitable for applying the activities of the Printing Production course.

In addition, students have a higher creative average score by using Digital Learning Tools, which found that social media has the highest number of uses and duration It corresponds to the concept of using social media in teaching and learning. It is an important issue at present. Teachers can apply this information to stimulate students' interest and use it as a technique to help them achieve academic achievement (Kobwit, 2011)

Moreover, teachers must have the knowledge and capability to use these tools in factual and sustainable teaching and learning processes. The teacher understands the techniques/tactics of the tools combined with teaching strategies and creating an interesting format for that student, is very challenging for teachers (Office of Technology for Learning and Teaching, 2011), which is consistent with the results of the above research that provides empirical evidence from data collection. As well as the time period for using it with the online learning management system, then analyzed for learning (Learning Analytics) is a tool to help learning design to meet the objectives, respond and support learners for effective learning.

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