Online Course Design for Creativity and Innovative Skills in Virtual Cultural ASEAN Community

From Research to Empirical Practice

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Abstract—The first component of learning skills and innovation in the 21st century is creativity and innovative skills. Methods supporting the development of both skills need to be created as a long-term plan and can bring out the benefit. The current education emphasizes on creating changes. To create changes, it is necessary to integrate modern teaching management with principles and theories of learning. The research on Virtual Learning Environment to Enhance 21st Century Skills in Creativity and Innovation of Higher Education Learners in ASEAN Cultural Community can be used to analyze about online learning using modern technology together with learning principles and theories to promote creativity and innovative skills of learners in the 21stcentury. Learning activities were developed to be interesting and challenging. Learners can access to learning sources easily and effectively. Activities were provided on Virtual Learning Environments (VLE) which can enhance students' learning and experience. Learning was not limited only to a classroom. It was open learning which allowed students to exchange information with instructors, foreign students, foreign friends, and local and international experts without the limit of time and place. Research tools included teaching plan emphasizing of creativity and innovative skills, the test of creativity and innovative skills, and a questionnaire for students. Data was analyzed quantitatively and qualitatively. The results showed that scores of creativity and innovative skills of a sample after studying were higher than that before studying with statistical significance at .05. The course was designed based on 7 steps of learning process: 1. Preparation 2. Identifying a topic or issue to be studied 3. Brainstorm 4. Creating innovation 5. Testing 6. Evaluation and 7. Presentation.

Keywords—Online Course Design, Creativity and Innovative Skills, ASEAN

1   Introduction

There is a firm belief that online teaching in higher education will become more common in the future [38]. This can be seen from an increasing number of student's registration in online courses in universities. For example, there has been a survey of online courses in U.S. since 2002. It was found that there were 1.6 million students

who enrolled at least one online course in 2012, and there were 5.5 million and 7.1 million students in 2012 and 2014 respectively [22]. Online course has been introduced in Thailand since 2007 [21]. The quality of online education has become more permanent and sustainable because online learning is flexible and inexpensive [7].

Online learning system, which appeals all students to attend their classes regularly, has to be properly designed from beginning to end the course [27], [34] for example, offering questions to students in each week and requiring their response before the course begins. This is to encourage students' interest to study before the lesson [9]. By using online chat with an instructor who motivates his students to pay attention, the system has a built-in function to record the online conversations ;therefore, the instructor can review information of students' history records afterwards. With these tools, the instructor can evaluate students' involvement and assessment of students' learning periodically [24]. Also, an internet forum enables students to have their conversation in the form of posted messages, leading to students' discussion and feedback. The forum can be designed by embedding background knowledge, social presence in group, type of discussion topics relating to higher-order thinking, cognitive strategies for eliciting discussion (e.g. debate, role-play), discussion group size, and intrinsic motivation to engage in discussions [13]. The effective approaches of online learning are: 1. The content acquisition approach, 2. The collaborative learning approach and 3. The knowledge building approach [6].

In addition, online test and self-assessment system can determine students' idea and students' understanding level [17]. Furthermore, the system can instantly send the evaluation result to students [5]. In conclusion, the instructor always has to interact with students in order to motivate students to pay attention and help students to verify answers or respective activities [45] Therefore, the effectiveness of online learning depends on the proper design of learning and teaching to improve the quality of instruction and to improve overall student outcome [23].

It has various forms and dimensions and open student's experience. Online education can accommodate the needs of both active and passive learning. It aims to provide students with challenging learning and can be accessed anywhere and anytime. It responds to the differences of an individual. Learners and instructors can communicate and interact with each other beyond the limitation of a classroom [19], [25]. It is learning and teaching management that expands beyond a classroom, allowing learners to practice thinking and research skills as well as to create new knowledge that can be transferred into innovation [42].

Creativity and innovative skills are important skills for learners in the 21st century, as Albert Einstein said, "Imagination is more important than knowledge". It is necessary to teach learners to use techniques for open creativity such as brainstorming, creating new things, and promoting thinking and intellect. Careful analysis and evaluation of concepts are necessary to contribute to the improvement and development of creative work. Henard and McFadyen [20] asserted the level of knowledge to create innovation: 1. Acquired knowledge, 2. Unique knowledge, and 3. Creative knowledge. Acquired knowledge comes from classroom, learning materials, and learning resources. Unique knowledge is the knowledge of an individual, developing from an understanding and experience, which can be used to solve problems. Creative knowledge is developed by integrating previous knowledge, acquired knowledge, and unique knowledge of an individual to create new knowledge. Creative knowledge is valuable and can lead to innovation. Innovation always relates to creativity. Learners who have creativity, especially in initiating new things are always good at creating innovation [39]. Characteristics of innovation are 1. Invention

that has never before appeared, 2. Invention that may appear somewhere else but it can be re-created freely, 3. New operation process, 4. Adjusting production process to the market differently, 5. New ways to solve problems, and 6. Concepts different from other people. Based on the simplicity and complication in creating innovation, it can be divided into two types: 1. Incremental innovation and 2. Radical innovation. Innovation with small changes is called incremental innovation which is the development or improvement of the existing products and innovation. The completed change of innovation is called radical innovation [15], [29]. The study found that innovation was always created by a person who had enough knowledge, creativity, and experience [11]. Therefore, in order for leaners to gain a large amount of knowledge, creativity, and experience in a short time, learning process must enhance these skills, in other words, the exchange of knowledge among instructors, learners, and experts [32]. Also, learners should be attentive, enthusiastic, and responsible. Learning environment should engage learners to enhance experience and knowledge effectively. Teaching and learning in the virtual learning environment is technology that helps learners to acquire knowledge and experience effectively because it is an open learning and does not limit to the classroom context. Learners will be challenged to learn, access to learning resources, and share ideas with instructors, foreign learners, foreign friends, local and international experts. The above mentioned context provides the concept of conducting this research as well as the author's previous experience in innovation. According to local and international research, learning that can develop thinking and innovative skills should integrate or support the use of modern learning technology and thinking techniques that enhance learner's creativity and innovative skills [31], [32], [40].

Virtual technology has currently become widely-used modern technology for encouraging learners' engagement and enabling them to understand what instructors teach explicitly. Augmented Reality (AR) technology is a combination of virtual world and physical world via tools such as camera, compass, and GPS [16], [18]. AR can be created to be any form of symbol. The code can be put on any objects such as clothes, glasses, paper, books, and name cards. When using web camera or smartphones with reality browser to capture an AR, we can see a model of a massive building or a brand of shop, products, or virtual human appearing and speaking on a computer screen. It is exciting that we can see 3D image via a smartphone or tablet, comparing to the previous 2D image [8]. AR has increased leaners' understanding of the lesson and content [30]. Apart from this modern technology, the research used online collaborative tools, especially creative tools to allow learners to develop creativity such as drawing, writing, and mind mapping. Collaboration software is special software consisting of collaboration system, communication system, and data collecting system for learning benefit. Collaboration technology used in this research has two purposes: 1. Collaboration for communication and 2. Collaboration for learning management. Collaboration for communication can be divided into two types: 1. Synchronous communication which requires interaction from both sides with instant response such as chat and video conference, and 2. Asynchronous communication which does not require instant response such as e-mail, web board, meeting appointment. Collaboration for learning management utilizes online collaborative tools which are web 2.0 tools that allow learners to create, revise, and edit content together synchronously and asynchronously via online [33], [43]. Social media was also used such as online mind mapping to present ideas of each person and comment other people's ideas without sending an e-mail. The tools were supported by cloud computing which is the most modern technology. Also, Learning Management System (LMS) was used to enhance learner's capacities [3]. It was used for student tracking

and asynchronous learning. In addition, 3D virtual world was also provided via Opensimulator program which is avatar-based virtual reality in the form of personal icons (picons) and virtual environment in the form of graphical representation to enable learners to chat with international peers anywhere and anytime [14].

Therefore, the success of online course management to develop creativity and innovation will occur only with an effective and good design of online learning [26]. The design should incorporate the technology as mentioned above. The designing of the course should base on learning theories and learning-centered instruction, including: 1. Cognitivism 2. Behaviourism 3. Constructivism and 4. Connectivism. Important dimensions include 1. Dimension of the ability to access learning resources through a variety of media 2. Dimension of the ability to provide learning information via media technology 3. Dimension of the ability to create interactive learning experience via interactive computer technology 4. Dimension of the development of learning ability 5. Dimension of testing which determines the quality and quantity of learning and 6. Dimension of systems and management of classroom.

2 The Beginning of ODCI System Process Design

The beginning process of the design of online courses to enhance creativity and innovative skills is to study designing principles and theories [4]. This research began with studying important variables: 1. Virtual technology 2. Concept of online learning 3. Process to enhance creativity 4. Concept of creating innovative knowledge and 5. ASEAN cultural community. In order to develop an online course on virtual learning environment, each variable indicated the process of developing creativity and innovative skills as follows.

1) Virtual technology. Ronald [35] stated that virtual technology combined real world and virtual world. The interaction is real time and the system is in 3D. The research used virtual technology in the dimension of ability to provide learning information via media technology. Learners can use virtual technology via smartphone to discover information that instructors have prepared such as videos about ASEAN etiquette. By scanning a picture in e-poster, learners can connect to learning resources. This technology can accommodate learners in traditional classroom and online learning via smartphones and other mobile devices such as tablets.

2) The concept of online learning is to use online learning system called Learning Management System (LMS) to improve teaching and learning via internet network to enable learners to access learning anytime [12]. Also, it further enhances learning with multimedia and learning resources which can create knowledge to learners. Learners can study according to their own learning pace, which responds to the differences of an individual, and can access to learning anywhere and anytime. This kind of online learning [1], [2], [10], [36] provides tools to support interaction between learners and instructors, learners and learners, and learners and system to exchange knowledge and create collaborative learning. The interaction can be both synchronous interaction and asynchronous interaction using online collaborative tools from the introduction of learners to evaluation of learning and innovation [41].

Online learning includes

Activities	1. Group activities have to provide both synchronous and asynchronous interaction. 2. Activities should be challenging and result in changing of learner's knowledge, behavior, and attitudes. 3. Activities should focus on working together as a team. 4. Learners must be responsible and learn by themselves. 5. Technology supports learning.
Measurement and evaluation	1. Instructors should give challenging assignments that meet the objectives. 2. Pre-test and post-test are available to estimate learning outcome. 3. Learning review and appropriated feedback are provided timely.

3) Enhancing creativity is thinking processes that promote the ability to think widely and innovatively and to be able to see the relationship of things and apply to theories that lead to the discovery and invention of innovation or ideas. The results can be different, ranging from creating entirely changes or partially development for better outcome. Songkram [43] found that the technology which helped foster creativity consisted of three major types: 1. Technology to exchange knowledge 2. Technology to create knowledge, and 3. Technology to discover knowledge. Factors that encourage creativity [37], [44] consist of 1. Motivation, 2. Interaction 3. Access to information and 4. Interest and attitudes.

4) The concept of creating innovative knowledge.

3 Knowledge Creation Leading to Innovation of SECI Model

Innovation is the introduction of something new in the form of ideas or actions, including products, inventions, process, or knowledge that has never been seen or appeared. It results from the use of knowledge, experience, and creativity to develop or change existing things to be better. The aim is to make learners learn quickly and effectively.

SECI Model is a knowledge cycle presented by Nonaka and Takeuchi [28]. It discusses knowledge conversion between tacit knowledge explicit knowledge which leads to new knowledge indefinitely because learning can occur anytime. Knowledge can occur in four forms: Socialization, Externalization, Combination and Internalization. Socialization is sharing and creating tacit knowledge by communication and exchanging direct experience. Externalization is creating and sharing tacit knowledge and transferring into explicit knowledge. Combination is collecting explicit knowledge and creating new explicit knowledge. Internalization is transferring explicit knowledge to tacit knowledge by applying knowledge into practice.

5) ASEAN virtual cultural community

ASEAN virtual cultural community is a virtual community that provides interaction via the use of communication tools to create the social network without the limit of geography, boundaries, or distance to create a group or society that have the same interest in ASEAN culture. The characteristics of the community include:

1. Common interest in any topic
2. Common belief or experience
3. Need to create a network of people
4. Need to be involved in the community

5. Feeling to be a part of the community
6. Need to develop and utilize the knowledge and wisdom in the community.

The results of the study were used to design online learning with teaching process, including as follows: 1. Preparation 2. Identifying a topic or issue to be studied 3. Brainstorm 4. Creating innovation 5. Testing 6. Evaluation and 7. Presentation. The details of design, activities and chart are mentioned in Figure 1, Table I and Figure 2 respectively.
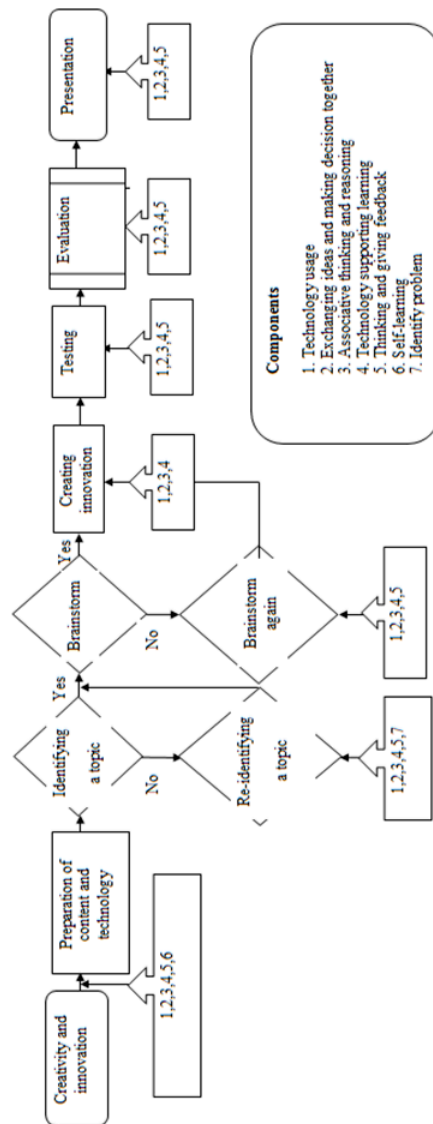

Fig. 1. The design of online learning to enhance creativity and innovative skills in virtual cultural ASEAN community

Table 1. Design Of Online Learning Activities

1. Preparation	1.1 Preparing students to use learning technology. Active activity: 'Welcome to My World'. Students write an introduction of himself/herself and upload their picture and introduce themselves to other students in virtual world. VLE: Open simulator 1.2 Preparing students to know about costume and etiquette of people in ASEAN countries. Active activity: 'Do & Don't'. Students write an essay describing their ideas about the similarities and differences of the etiquette of people in their country, comparing to other ASEAN countries in Moodle and VLE: Open simulator.
2. Identifying a topic or issue to be studied	Active activity: 'Share & Shout'. Students in a group discuss about the distinct etiquette of people in ASEAN countries in VLE: Open simulator. After the discussion, each group uploads their answer to Moodle.
3. Brainstorm	Active activity: 'What is it?' Each group of students answers the question 'What is the distinct manner of people in ASEAN country?' in VLE: Open simulator After the discussion, each group uploads their answer to Moodle.
4. Creating innovation	Active activity: 'Making an I-Poster'. Each group of students jointly make I-Poster which is an innovation showing 'Do & Don't' etiquette of people in ASEAN Country in VLE: Open simulator AR (Augmented Reality) is used to design the poster. After designing I-Poster, each group uploads the draft file in Moodle to show the instructor and students in other groups.
5. Testing	Active activity: 'Joining Feedback'. Students review the poster of other groups and discuss 'Do & Don't' of each group. From the discussion, analyze 'Do & Don't' etiquette of people in ASEAN countries in Moodle. After getting an answer, each group uploads the answer to allow other groups to review and compare with their finding.
6. Evaluation	Active activity: 'Reflection by a Journal'. Students review the answer of other groups on 'Do & Don't' etiquette of people in ASEAN countries. Then students write an essay advising tourists who travel to ASEAN countries in LMS: Moodle and exchange an essay between groups.
7. Presentation	Active activity: 'Comment & Like'. Students summarize information getting from the essay, discussing common costume and etiquette in ASEAN countries and choose the most favorite essay and give reasons in VLE: Open simulator and in Moodle.

Supporting technology
Community Tools: 1. LMS: Moodle 2. VLE: Open simulator
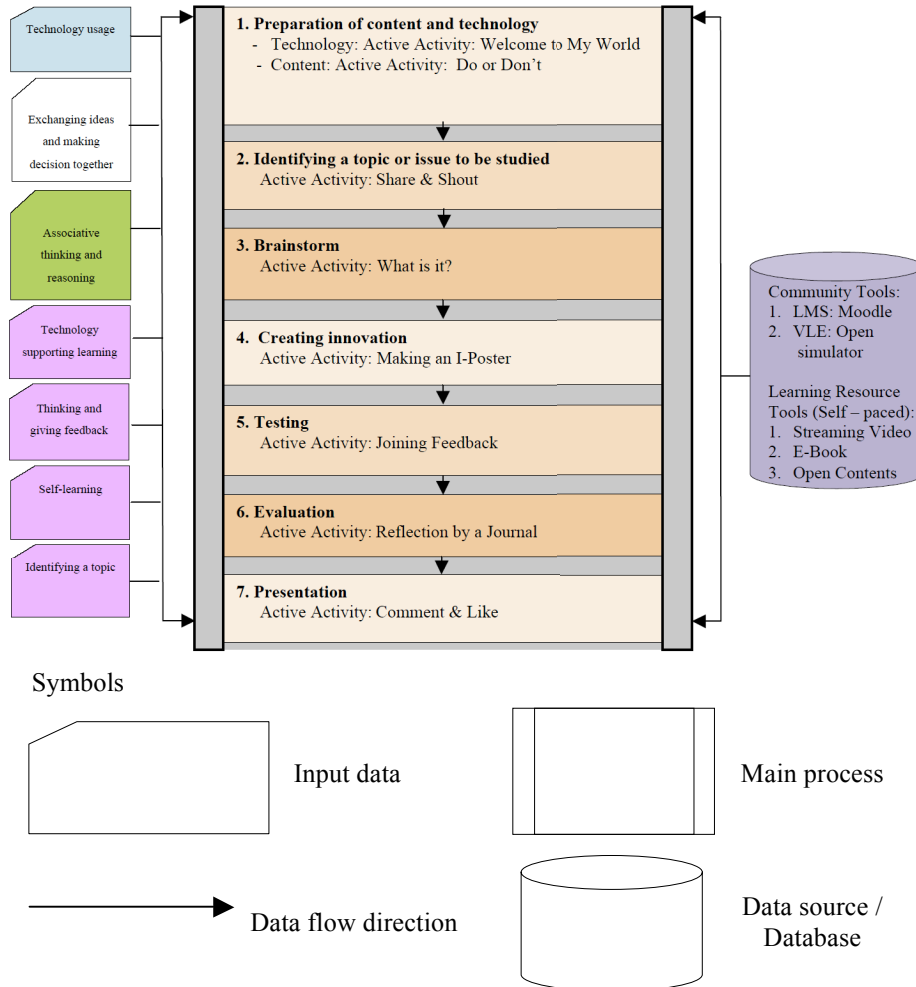**Learning Resource Tools (Self-paced):** 1. Streaming Video 2. E-Book 3. Open Contents

Fig. 2. Creativity and innovation map

3.1 System Approach

The development process of Online Course Design for Creativity and Innovative Skills (ODCI system) involves analysis and synthesis based on the researcher's real experience in working in the virtual learning environment which was applied in accordance with this research. The ODCI system has been developed as follows. (refer to Figure 3).

Stage 1: Planning The researcher planned the development process with experts to gain recommendations concerning to the development of the system. The plan includes:

1) Setting goals. The researcher informed the experts about the objectives of the research and target group.

2) Analyzing related factors by determining the scope of the research which was a sample of learners in ASEAN to develop a plan of action and design the system. The related factors include:

2.1) Target group and the learning need. It was determined by reviewing the characteristics of learners, including age, level of basic knowledge, and English ability.

2.2) Content. It was determined by analyzing the content of ASEAN culture to define the scope of the content. Based on the targeted content to be transferred to learners, then the scope and topics of the content were set. Then, main topics and sub-topics were organized to be relevant. This research focused on ASEAN etiquette.

2.3) Related resources. The analysis of all the resources was conducted to determine the resources that will be used to develop the system, including information resources, personnel, hardware, software, and budget. Information was collected from documents, textbooks, and resource persons. The number and roles of production personnel was analyzed.

3) Developing a plan of action. Data from the analysis was used to create a plan of action which divided into stages. In each stage, responsible persons and duration were set. A clear target was set as an indicator in each stage. The meeting was held in this step to inform the concerned persons about the plan of action.

Stage 2: Design This stage was to design a system prototype for the production unit to produce. It started by defining the objectives of the lesson and transferring the content into activities. Then, the content and activities were further developed as the following steps:

1) Writing behavioral objective is to re-write the general objectives into behavioral objectives. This will indicate the expected behavior of learners after finishing learning. The behavior must be able to measure and observe. The word used in the objectives should be a verb that describes the specific identification such as explain, differentiate, compare, analyze, etc.

2) Writing the content. The content was written in a lesson plan after being analyzed. An implementation step of the learning plan was also clearly stated. The content was converted into multimedia to support virtual technology, including e-book, AR, Streaming video, LMS, and 3D virtual world.

3) Determining teaching models, methods, and evaluation. Based on the content, teaching methods were determined to respond to variables, creativity, and innovation.

4) Planning course structure and navigation. The structural design of the system was to determine the relationship of the various components, including introduction unit, content, exercises, quizzes, etc. The structure also shows the ways to enter each section of the lesson. Learners can learn in a linear or non-linear path. Normally, course structure and navigation are based on the scope of the content and instruction models as well as the characteristics of learners to design for proper usage.

5) Writing a flow chart. A flow chart refers to a chart that shows the relationship of the lesson content in each frame or each section from start to finish.

6) Designing interface layout. This is to determine the components on the screen such as content section and organization of topics. Normally, a template was created for convenient use.

7) Writing a storyboard. The developing team used the results of the previous steps to extend the details and write a storyboard. Normally, it is in a paper which shows the

details of each page. Then, the storyboard will be developed into a program by the programmer team.

State 3: Development Development phase includes:

1) Preparing the media for content presentation. In this step, the team analyzed the storyboard and media to be used in each page of the storyboard. The media was grouped in a category in order to facilitate responsible persons and was reviewed by content and instructional design experts to consider the validity and appropriateness of the media used. The steps include:

1.1) Preparing text for the production team in Word format for convenient use.

1.2) Preparing graphics, both animated and still images in a computer file format that is not copyright infringement.

1.3) Preparing audios, both narration and sound effects by recording the sound.

1.4) Preparing the media for virtual learning environments.

The media for virtual learning environment included Streaming video, e-book, AR, 3D virtual world. The production was based on multimedia production process and was test for effectiveness of each media. Then the media was published on the system for learners to use.

2) Preparing graphics for screen decoration. Graphic designers designed the graphics according to experts' opinions, including page background, banner, link which were suitable for the context of the lesson.

3) Programming. Additional objects in the virtual world, including houses, meeting venues, virtual environments were created. This step was done by specialists in the virtual world. At this step, the programmer must combine screen graphics, including still images, animated images, videos, and audios to develop the program.

4) Testing. A similar group to the sample tested the system to find errors (bug) and modified the program. Then, the test was conducted again to make sure that there were no more errors.

5) Developing a user manual. The manual was to facilitate a target group who use this lesson. It consisted of a manual for instructors and a manual for learners. The manual described how to use the program and identified computer and operating system requirements. It also included advice on the process of teaching and the role that instructors should follow to enhance the effectiveness of the lesson.

Stage 4: Evaluate and Revise This phase includes:

1) Expert evaluation. The system was evaluated by five content and instructional experts. Then, suggestions and comments of experts were used to revise the system. Evaluation topics include:

1.1) Content evaluation.

1.2) Media evaluation in 3 features:

1.2.1) Instructional design.

1.2.2) Layout design.

1.2.3) Usage design.

2) Learner Try-out. The system was tested by target leaners. It was divided into two steps.

2.1) Pilot Testing. The first step was testing the system with three learners who were the representatives of a group of sample. The group included learners who had good, average, and poor school record. The mixed selection allowed system designers to see

problems of an individual with different school record. Testing included learning behavior observation, answering questions, and learning control, linking, media access, and time spent in learning of each leaner. Before the testing, learners knew the objectives of the lesson. This was to enable learners to observe and provide detailed suggestions for system improvement.

2.2) Field Testing. The next step is to test the revised system with 30 learners who were the representatives of an actual group of sample to measure the effectiveness of the system. Learning environment was similarly arranged as the actual condition. Before the test, the instructor explained the objectives of the lesson and introduced how to use the system briefly. Then, learners studied the lesson by themselves as follows.

2.2.1) To find the effectiveness of the system. This was based on the ratio of the effectiveness of activities or tasks assigned to the effectiveness of the outcomes of the test.

2.2.2) To measure creativity and innovation. An assessment was based on the scores of work and scores that the experts gave to learners after studying.

3.2 Research instrument.

1) Creativity and Innovation Evaluation. This consists of 35 open-ended questions rating by 5-point rating scales with Cronbach's Alpha = .985.

2) Evaluation of learners' behavior. It is leaning observation form in the class. There are question items with the indexes of Item-Objective Congruence (IOC) between 0.80-1.00.

3) A survey of student's satisfaction on the use of system. It is closed-ended questions rating by rating scales, consisting of 1. Satisfaction with teaching activities in 7 items (Cronbach's Alpha =.906) and 2. Satisfaction with educational media in 36 items (Cronbach's Alpha =.957).

3) Revise. When the results were ready, the similarity and difference of opinions from experts and a group of sample were considered. The variables from the sample group were measured. The researchers brainstormed and revised to make the system more completed.
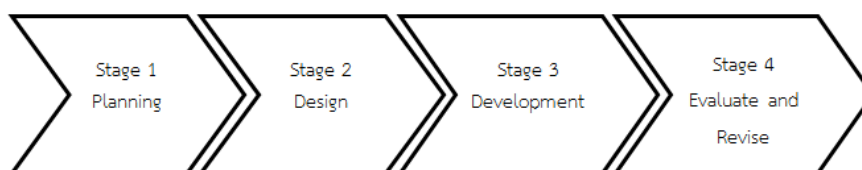

Fig. 3. Development process of ODCI system

4 RESULTS

1) According to Table II, the comparison results of creativity and innovative skills before and after studying.

It showed that the sample group of 30 students had average scores of creativity and innovative skills at 2.74 with standard deviation at 0.79. After studying, they had an

average score of 4.29 with standard deviation at 0.41. The results of the test of the differences between average score of creativity and innovative skills before and after studying by using independent statistical test indicated that average achievement test score was statistical difference at .05 level of significant (t-value = -9.305, p = .00).

Table 2. The comparison results of creativity and innovative skills before and after the test

Evaluation	N	$\bar{X}$	S.D.	t-value	p
Before studying	30	2.74	.79	-9.305	.00
After studying	30	4.29	.41		

*p < .05

The analysis of the behavior of the sample found that students were satisfied with an overall teaching and learning at a very good level ($\bar{X}$ = 2.85, S.D. = .36). The evaluation of each aspect found that identifying a topic or issue to be studied, evaluation and presentation had the highest average scores ($\bar{X}$ = 3.00, S.D. = .00).

The evaluation of innovation found that the total scores of every group was at very good level ($\bar{X}$ = 2.61, S.D. = .49). The evaluation of each aspect found that in the standards of innovation development process, testing, innovation prototype testing, and innovation presentation and publishing had the highest scores ($\bar{X}$ = 2.81, S.D. = .39), followed by creativity analysis ($\bar{X}$ = 2.75, S.D. = .44). In the standards of values, collaborative learning among innovation developers had the highest scores ($\bar{X}$ = 2.81, S.D. = .39), followed by the possibility in practice and recognition by users ($\bar{X}$ = 2.77, S.D. = .42). In the standards of innovation, the creation of innovation had the highest scores ($\bar{X}$ = 2.52, S.D. = .50), followed by new things, new innovation, or new methods ($\bar{X}$ = 2.48, S.D. = .50), and copyright or patent ($\bar{X}$ = 2.33, S.D. = .48) respectively.

The analysis of satisfaction in learning in virtual learning environment in the aspect of learning activities found that overall satisfaction was at high level ($\bar{X}$ = 3.97, S.D. = .63). As for each aspect, leaners were most satisfied with presentation ($\bar{X}$ = 4.20, S.D. = .41), followed by setting working rules together ($\bar{X}$ = 4.07, S.D. = .64). Learners were satisfied with identifying a topic or issue to be studied stage ($\bar{X}$ = 3.93, S.D. = .58) and creating innovation together ($\bar{X}$ = 3.93, S.D. = .64) equally.

2) Learners' behavior levels.

As shown in Table III below, the study found that students get their "very good" results in behavior level by using the system. In overview, there is $(\bar{x})$ = 2.85 (S.D. = .36) and in each aspect , there is $(\bar{x})$ between 2.53 and 3.00 (S.D. range between .00 and .51).

Table 3. Learners' behavior Levels

Statistics	1. Preparation	2. Identification of issue or topic to be studied	3. Courtesy Rules	4. Education and Exchange	5. Product creation	6. Product evaluation	7. Product presentation	Overall stages
$\bar{x}$	2.87	3.00	3.00	2.57	2.53	3.00	3.00	2.85
S.D.	0.35	0.00	0.00	0.50	0.51	0.00	0.00	0.36
Evaluation	Very good	Very good	Very good	Very good	Very good	Very good	Very good	Very good

3) Student's satisfaction in the use of system.

As shown in Tables IV below, students responded that they were "very satisfied" in overall state at a very good level ($\bar{x}$ = 4.18, S.D. = .65). The evaluation of each aspect found that students "very satisfied" in Learning and Teaching ($\bar{x}$ = 4.23, S.D. = .64) as well as Learning media ($\bar{x}$ = 3.97, S.D. = .63).

Table 4. Satisfaction In Learning By Using Virtual Learning Environment

Evaluation	$\bar{x}$	S.D.	Result
1. Learning and Teaching	3.97	0.63	very satisfied
2. Learning media	4.23	0.64	very satisfied
Average	4.18	0.65	very satisfied

5 DISCUSSION

The highlight of the system is that it provides One Stop Learning Service and modern online learning tools. The system facilitates quick and easy access. It develops learners in terms of their skills in the 21st century and an understanding and awareness of being a part of the ASEAN cultural society. The innovation has outstanding features that are different from other systems as follows.

1) The highlight of the system is that it provides One Stop Learning Service and modern online learning tools. The system facilitates quick and easy access. It develops learners in terms of 1. skills in the 21st century and 2. an understanding and awareness of being a part of the ASEAN cultural society. These skills and knowledge are important to drive the country towards internationalization and express readiness to step into the leadership of the ASEAN community as well. The system provides both 1. tools such as Moodle Learning Management System: LMS and 2. Virtual Learning

Environment: VLE. It focuses on virtual classroom in avatar-based virtual reality / personal icons (picons) and virtual environment in the form of graphical representation such as houses and meeting rooms. The tools are used for exchanging learning and presentation in virtual world. Activating print pages with digital AR content is used to motivate learners to create innovation and exchange learning.

2) The system was developed using Moodle and Open Simulator, which is open source software. It allows those who are interested to use and further develop it. The developers have provided a link to download the software, including Imprudence 1.3.2, CUMOODLE56 which was developed from Moodle, open source software, using PHP language and MySQL database. Open Sim0.731 and OAR Grid TCU is server software developed from Open simulator, an open source software to create virtual world using C# language and runs on Mono or Microsoft.NET systems and uses MySQL database. Also, other tools supporting international communication free of charge are also provided such as Video Conference System: Red5 technology developed by Flash Streaming Server, which used JAVA (JREE), a plug-in installation with Red5. Other social media are also provided focusing on Open Educational Resources: OER with additional development to provide completed content which will be benefit for exchanging learning between cultures and widely using.

6   CONCLUSION

Virtual learning environment to enhance 21st century skills in creativity and innovation for higher education learners in ASEAN cultural community can be applied to develop creativity and innovative skills. The system can be applied to both text-based learning and virtual based learning. The components and procedures are derived from the research synthesis and advanced statistics as well as consultations with a group of experts to create the most effective system. The system was tested with a group of sample and the results were as the mentioned variables. The system was developed from open source software which can be adapted to use in other contexts. Virtualization technology also opens source software with avatar-based virtual reality in the form of personal icons (picons) and virtual environment in the form of graphical representation. The research presents an active learning focusing on modern technology and ASEAN culture. The objective is to create expanded learning and is not limited to Thailand context but expand to international context. In order to enter the ASEAN economy, preparing students to have skills and knowledge be able to apply them in the real world is important. The system is a prototype which can be implemented in an actual teaching as evidenced by the findings and learner satisfaction. The system will have to be analyzed and adjusted according to the context and environments in which it will be used to meet the expected goals.

7   Acknowledgements

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