



Twenty First Century Skill Attainment Using Creative Learning Cycle Method with Learning Management System Media (A Case Study of Basic Programming Subject in 11th Grade Computer and Networking Study SMKN 1 Cimahi)

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ABSTRACT

Twenty first century skills is a set of skills that has to be mastered by students in order to win new era competitions where the competitions are started to open globally. Several researches have shown that Creative Learning Cycle method can help students to master the twenty first century skills and make learning process more meaningful. The purpose of this research is to identify the influence of Creative Learning Cycle learning steps to the students' twenty first century skills. Another purpose of the research is to make a learning management system (LMS) that might enhance learning process done with Creative Learning method. Aside to manage the learning process, LMS can be used as twenty first century skills evaluation media in each step because it has been integrated with twenty first century learning parameters according to the analysis that has been done before. Even though in the end the LMS that has been built cannot accommodate all Creative Learning Cycle learning steps, LMS still get positive response from the teacher and students who use it.

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1. INTRODUCTION

The Government of Indonesia has an effort to prepare students to face global competition and modern trade that will happened soon through make 2013 curriculum (Maryanti, et al., 2020). One of the principles in 2013 curriculum is about balancing physical skills (hard skill) and metal skill (soft skill), and in order to support the principle there are three graduate competences, they are attitude, knowledge and skill (Radcliffe, 2005). But the process to define the attitude competence is still insufficient to prepare students in facing global competition (Kim, et al., 2019). There is a more applicable and clear formulation about the skills that has to be owned by the students in twenty first century (Bedir, 2019). This formulation is named 21st Century Skills. Many organizations and figures issued the formulation of its framework, one of them is Partnership for 21st Century (P21) (Afandi, et al., 2019).

Creative Learning Cycle method considered can develop students' 21st Century skill (Luka, 2019). Technological infrastructure is also a crucial thing that needed to support 21st Century learning process (Curiyah, et al., 2020). Learning Management System (LMS) can be a missing link that bound contemporary education used creative and innovative technology (Marachi & Quill, 2020).

Based on the problem and the opportunity aforementioned research has been done to investigate significance of Creative Learning steps influence to the attainment of 21st century skill (Sumarni & Kadarwati, 2020). And the analysis of the data implemented in making Learning Management System so the LMS can be a media to asses students twenty first century skills (Khlaisang & Koraneekij, 2019).

2. METHODS

The method used is mix method with quantitative as primary method. Using concurrent embedded method researchers are able to collect two kinds of data simultaneously (Wang, 2003).

Research carried out with treatment given to the two classes used Creative Learning method. The result of each cycle collected as research data. In the end of one learning cycle, students asked to fill self-assessment sheet that contain 21st Century skill parameter. Then data gathered are analyzed to identify which cycle is influencing the students 21st Century Skills attainment. Based on the analysis, the LMS made to measure students' attainment of 21st Century Skills. The LMS in this research was made using waterfall method.

2.1. Sample and Population

Research carried out in 11th grade Computer and Networking SMKN 1 Cimahi in basic programming subject. The classes available are two classes with total 67 students. Sample of the research are all of the population.

3. RESULTS AND DISCUSSION

3.1. Data Description

Based on the students' self-assessment about their 21st century skill attainment, average score of students' Learning and Innovation skills score (LIS) is 4.27 of 5 or 82.40%, average score of Information, Media, and Technology Skills (IMTS) is in higher position in 4.27 or 84.10%, while Life and Career Skill (LCS) in the lowest point 4.02 or 80.42% (**Figure 1**).

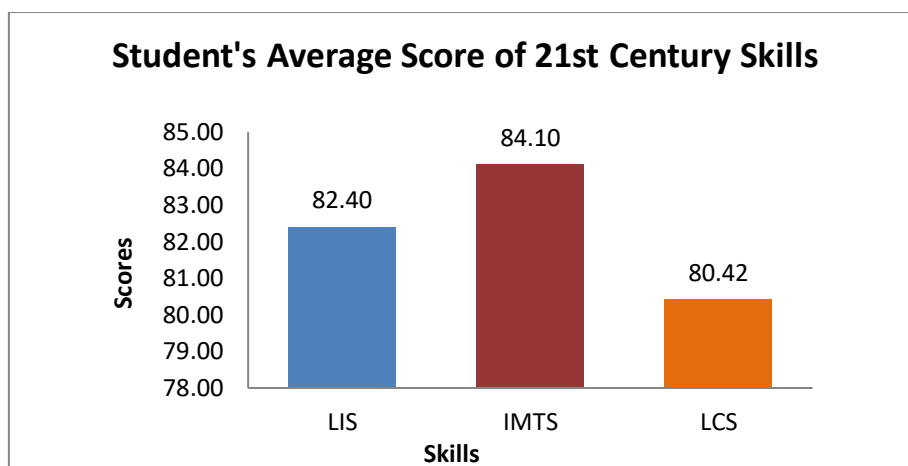


Figure 1. Student's average score of 21's century skills.

In LIS skill highest score category is Creativity and Innovation Skill Skill with 84.98%, while the average score of critical thinking and problem-solving skill is 81.64% and score for communication and collaboration is 79.85%. All LIS skill scores are in very good level.

Based on the interview to the students, after experienced learning used Creative Learning method they are confidence that their creativity is increasing they have freedom to choose the project that they are like even though it has to be in line with the theme.

At IMTS skills, there is one category that has the highest value of all the items of the 21st century skills questioned, called the media skill. Media skill has a value of 87.61% which is categorized as very good. In this category the skill item is to analyze and create media. Students feel they have good skill in analyzing media because in the Creative Learning method there is Experiment stage where students have to take the risk to test the project made. Information skill also has a very good value, which is 84.03%. The students admitted firstly they find it difficult because they have to be careful in finding reliable material or references. But once they are accustomed to looking for material based on the needs of their project, they finally get used.

In LCS skill there are four skill categories which contain 2 to 4 skill items. The category which has the highest average value percentage is flexibility and adaptation skill, in the value of 82.5%, while the lowest average value is Leadership and Responsibility.

Based on interview with students, their value of Flexibility and Adaptability is high after learning with Creative Learning method because in the project making process they are required to always negotiate, delivering opinion and open to the opinions of others. They are accustomed to being disciplined in making the project and achieve the target, even should always be ready with strategy changes in project making process. Regarding the value of leadership and responsibility that is not too significant, most students admitted during the project they were not given the opportunity to lead or even guide others. Students who have better skills than the other students tend to take control and control other students, while students who feel they have insufficient skill prefer to be led and guided. In group work not all students can be the leader. The results of the interview concluded that students who used to lead them fill the self-assessment form with high score in guiding and leading others, while students who used to be led gave low score. Because the number of students who led is higher than students who lead the average score is more inclined to the lower score.

The score of students' learning phase obtained from the students' learning outcomes assessed step by step. At this stage of the assessed Imagine is an idea and project planning, the Create phase score taken from the results of an assessment of the products made by students, Experiment phase score obtained from the results of an assessment of self-reported test results of students' products, score in the Share stage taken from the assessment while students doing presentation and class discussion, while score of Reflect stage taken from the report of input given in share stage to evaluate and revise the product (**Figure 2**).

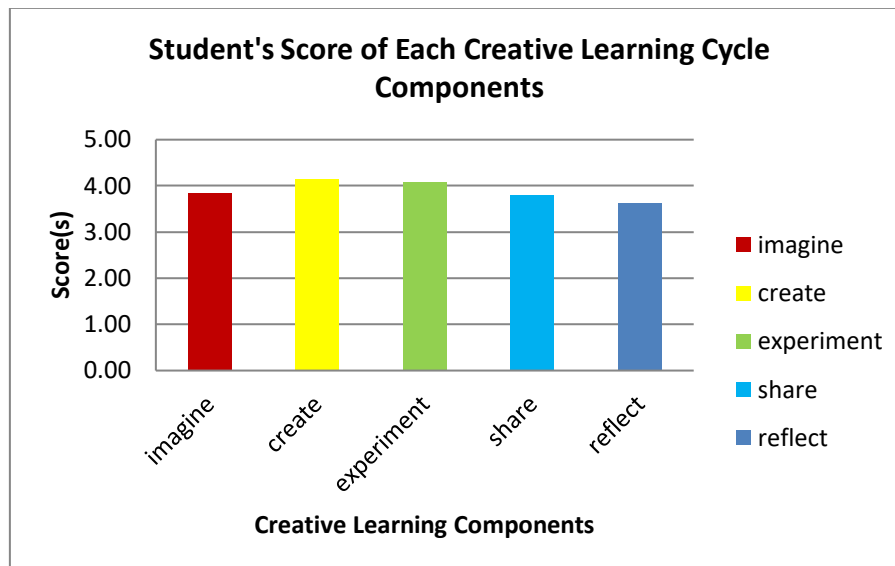


Figure 2. Students' score from learning outcomes.

The average score of students' Imagine is in the middle position, with the top three position but also in the bottom three position. Based on interviews and observations conducted on students, imagine stage is the most difficult stage that they face. This is because students are not accustomed to being given the freedom to choose what products they will make based on the theme. The biggest problem that should be experienced by students is an ability to measure their skills. Many groups of students who have high expectations or objectives, but their skills are still not able to achieve the goals that they expect. It requires them to think more critically and more careful in managing information for reference and planning of the project they will do.

Students' Create score is in the second highest ranked and included into the very good category while Experiment score is at its lowest position despite the good category. It shows that the students' skills in creative and make the products has been very good but their skills in self-reflection is still not as good as the skill to produce these products. Based on observations, the low score of this Experiment because students still feel confused about how to check the programs, they make is good or not, and students tend to cover up the shortage. They are worried to show a lot of weakness in the program then the score of the program would be reduced so that they tend to be defensive by covering up the flaws and make reasons that these deficiencies had been planned in advance.

The score of Share stage is the second lowest score after the score of Reflect stage even though it is in the very good category because it is above 75%. Based on the observation, student skills in communicating when describing the products, they made or give comments have been very good, although in each group there are still one or two students who have

difficulty in speaking. The biggest communication problem that students have is the skill to communicate formally in the forum and the volume and clarity of their speech.

However, the students' score of Reflect is the highest score compared to the others. Based on the observation done, students are quite cooperative and are able to receive critic openly.

3.2. Result Analysis

Learning phase which has an estimated influence value to the LIS skills (learning skills and innovation) is the Imagine stage. Imagine stage affect students' LIS skills with the value of the estimated effect of 0.514. This means that if the student's skills in conducting learning activities in the Reflect stage increased by 1, then students' LIS skills will also increase by 0514. Another stage is influencing LIS skills but insignificantly.

The most influential learning phase at IMTS skills (Information, Media, and Technology Skills) is the stage Create and Experiment with the estimated value of the effect 0.525 and 0.393. Another stage is affecting IMTS but not significant due to the influence of the estimated value is lower than the estimated value of its error standard.

While the most influential learning phase in LCS skills (life and career skills) is the share stage with the estimated value of the effect of 0.349. Another stage is positively affecting but not significant to LCS skill.

Table 1. Standardized effect.

Skill	Creative Learning Cycle' Components				
	<i>Reflect</i>	<i>share</i>	<i>experiment</i>	<i>create</i>	<i>Imagine</i>
IMTS	0.000	0.000	0.362	0.422	0.084
LCS	0.008	0.501	0.097	0.267	0.013
LIS	0.366	0.277	0.004	0.075	0.381

Learning stage that affecting LIS skill is the Imagine stage with significance value of 38.1%. The second position affecting LIS skill is Reflect stage with significance value of 36.6%. While the stage Create and Share affects the LIS skill by 27.7% and 7.5%, Experiment stage effect with a very small significant value 0.4%.

The most influential learning phase at IMTS skills (Information, Media, and Technology Skills) is the Create phase with significance value of 42.2%, while the stage Experiment effect 36.2%, and the Imagine stage effect is less significant with value of 8.4%.

While most influential learning phase in LCS skills (life and career skills) is the Share stage with significant value 50.1%. Another stage which influences quite high on LCS skill is the Create phase with significant value 26.7%. Imagine stage, Experiment, and Reflect has no significant effect due to the significance value is under 10%.

3.3. Learning Management System Making Process

LMS is made based on the analysis result in order to possibly assess students' 21st century skills based on the learning phase conducted. LMS-making process is conducted in stages of analysis, design, development, and assessment.

1) Analysis stage: At the stage of analysis, it was decided that the assessment used at the stage of Imagine is LIS assesment parameter, create assessment stage using parameter IMTS and LCS, the assessment at the stage of Experiment using the parameter IMTS, assessment at the stage of Share using parameters LIS and LCS, and the assessment on Reflect stage using

the LIS parameter. In addition, it was also decided that the LMS developed is better to be more general, not just focused on Basic Programming subject and will apply the concept of peer assessment evaluation in it.

2) Planning Phase: LMS used to accommodate the teacher's instructions, students' learning report, and assessment among students. Figure 3 shows the steps of adjusted LMS based on Creative Learning method. Based on the consideration and recommendations from LMS analysis phase, in the planning phase it was decided that LMS only accomodating Imagine phase and Create reporting phase

3) Development Phase: The interface created on the LMS using the Bootstrap template "Dashgum Free" which has cc0 license. To create a dynamic display coding using PHP and Javascript has been done. For data storage used MySQL database. At this stage, validating process by experts of material and media also has been done with good results and fit to use.

4) Assessment phase: Assessment done by 67 TKJ students and 5 TKJ teachers of SMKN 1 Cimahi using E-Learner Satisfaction assesment instument that were composed by Wang [13] and the Learning Object Review Instrument made by Nesbit, Belfer, & Leacock [14]. The assessment results of the students using ELS and LORI instruments are 76.21 and 75.61. The evaluation of teachers using ELS and LORI instruments are 75.60 and 75.11. So, the average results of the assessment of students and teachers used these instruments is 75.63, which means in the very good scale marginally.

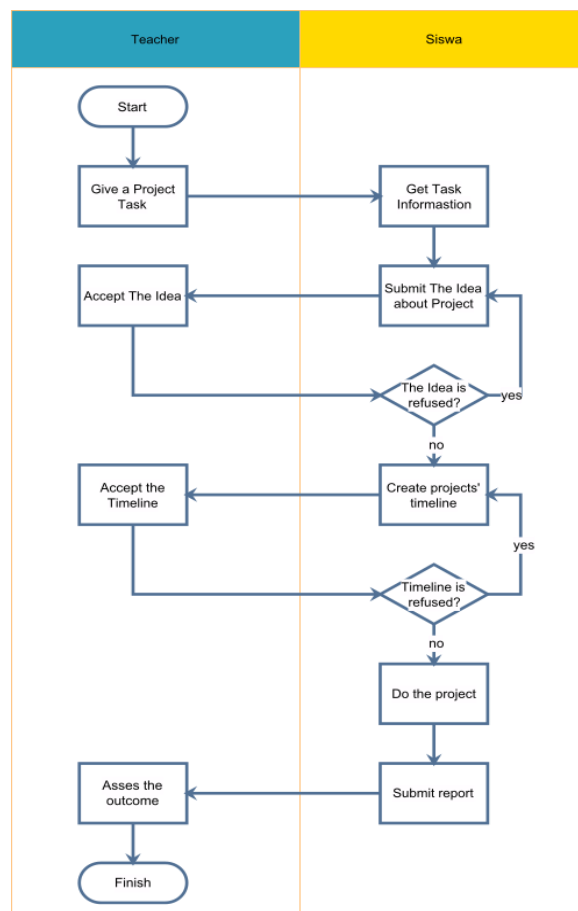


Figure 3. Flowchart overview of the program's flow

4. CONCLUSION

All stages of creative Learning give positive influence on the attainment of students' 21st century skills in Basic Programming subject although not all of them have significant effect. Creative Learning phase that has the most significant influence on the learning skill are Imagine and reflect phase. And Creative Learning phase that have biggest influence on the Technology and Information media are Create and Experiment. While life and career skills influenced significantly by Share phase.

Imagine stage affects Learning and Innovation Skills 38.1% while Share stage affects 27.7%. Significance influence of Create phase on The Media Information and Technology Skills is 42.2% while the stage Experiment influence 36.2%, while Share stage has the highest significance influence.

Learning Management System (LMS), which built was not able to accommodate all learning activities in Creative Learning Cycle. LMS can facilitate the delivery and assessment of ideas among students, helping creating students' schedule and upload their work in accordance with the activities described in the schedule. Besides other functions that correspond to the stage of the Creative Learning Cycle is a function to share, comment and giving score. Thus, the stage that was not covered by LMS is the initial stage of the Create and Experiment in which students perform coding and testing because LMS can only be used to upload the work of the two phases of the course. While the Reflect stage was helped by LMS on providing feedback to the reflection only.

The purpose to implement an attitude assessment based on the 21st Century Skills parameters in learning activities step by step on LMS was implemented. However, due to limitations of the LMS that has been described previously, the entire learning phase cannot be assessment using the LMS. In addition to step-by-step assessment, LMS can also be used as an assessment media among students about their performance when working on a project based on 21st century skills parameters in accordance with the teacher's demand when the interview was conducted.

Although it cannot fully accommodate all of the stages in Creative Learning Cycle, this LMS still got positive response from the students and teachers that have test and assess it. Further research is needed to study the LMS effectiveness to maintain the learning process and its accuracy to measure the attainment of students 21st Century Skills.

6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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