

Project-Based Learning Paper: Learning Model To Develop 4cs (Critical and Creative Thinking, Collaboration and Communication Skills)

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Abstract

Critical, creative, collaboration and communication skills (4Cs) are four essential skills needed to survive and thrive in the 21st century. The 2013 curriculum has included 4Cs as a paradigm in curriculum development. Unfortunately, its implementation in classrooms is still limited to discourse. This study aimed to find a learning model that can be used to help teachers to master 4Cs according to the subjects they are teaching. The initial design developed was the Teacher Training Model with Project-Based Learning (PjBL). However, this PjBL model could not be used effectively to build 4Cs skills. After experiencing various revisions, a formula that could be used to develop 4Cs was found, called Project-Based Learning PAPER, with the following 5 syntaxes: (1) presenting a significant issue, (2) analyzing the existing condition, (3) planning the project, (4) executing the project, and (5) reporting the project. The 4CS in the PjBL PAPER were not specially trained for the participants but were used as examples, and the participants could imitate the application of these 4Cs in the implementation of their PjBL. The 21st-century skills (4Cs) were infused into PjBL learning. Project-Based Learning PAPER was proven to help teachers to master 4CS easily.

Keywords: project-based learning paper, critical thinking, creative thinking, collaboration, and communication skills

Introduction

This article was written based on the results of preliminary research on learning model appropriate for training teachers in Integrated Excellent School of Tana Tidung Regency, North Kalimantan. *Lembaga Penelitian dan Pengabdian Masyarakat (LP2M)/Institute for Research and Community Service, Universitas Negeri Malang* collaborates with Department of Education of Tana Tidung Regency in developing Integrated Excellent Elementary Schools and Junior High Schools in Tana Tidung Regency, North Kalimantan from some aspects. In term of the teacher, the integrated excellent schools need excellent teachers mastering competencies required to live in the 21st century namely critical, creative, collaboration and communication skills (4CS) (Forum, 2015). This project is significant to do since the teacher's quality is the indicator of the quality of specific educational institution (Dhakidae, 2017).

The teachers in the Industrial 4.0 era do not only have to master facts, concepts, events, formulas, theories, or information. This case is because all information will be readily obtained by students anytime, anywhere by Google searching or Google engine, Wikipedia, youtube, twitter, facebook, cellphone, and other virtual media. All virtual media provide information mostly and unlimitedly. Industrial 4.0 era is the first fundamental revolution that changes the way we live, work, and interact with the others (Schwab, 2016); (Harteis, 2018). The teachers are not the only source of information; various virtual media have replaced their role. The teacher's role in the digital era nowadays is supporting/helping students to validate information, synthesize information, leverage information, communicate information, collaborate with information, and solve the problem with information. The skills needed by teachers to play their role in the Industrial 4.0 era are 4CS: critical thinking, creative thinking, collaboration, and communication skills.

Critical thinking is the result of logical, reasoning, and reflective thinking focusing on what should be believed in or done (Costa, 1991). Logical and reasoning thinking can show the right reason or justification, and reflective thinking means thinking seriously of what has been read or listened to and it involves the activity to evaluate or assess the validity of information and opinion found. Critical thinking includes knowledge and external values to deliver and evaluate presentation and decide what should be accepted as a truth finally (Facione, P. A., 2015). Critical thinking includes the ability related to assess, evaluate a particular problem or topic, and evaluate your reasoning (DeWaelche, S.A., 2015).

Creative thinking is the skill to form a new idea or develop the combination of some ideas to be a new idea to fulfill specific need (Marin, L. M. & Halpern, D.F., 2011). Creative thinking is the way of thinking that orients to a creative outcome (Marzano & Pickering, D.J., 1992). The characteristics of creative result are the novelty, the benefit, and value (Harrington, 2018); (Gaut, B., 2010). The novelty refers to the idea that the product of creativity should be a different, new, or innovative thing. The benefit relates to creative thing that should be beneficial for a certain context. The value refers to imagination, innovation, originality, and intelligence (Paul & Elder, 2008); (Swann, Pope, & Carter, 2011). Creative thinking starts with the sensitivity of the problems or challenges happening.

Furthermore, there is originality arising in someone's mind related to what is identified. Creative thinking is also seen in the form of ability to find out new relationships from the point of view that is different from before. The more important thing, creativity is the foundation or basis of the realization of educational innovation (Shavinina, 2013).

Collaboration and communication skills are two skills developing through social interaction and emotional learning (Forum, 2015). Collaboration is the activity or action to cooperate with other people to create or result in something. Collaboration skill demands someone to interact productively with their colleague. The successful collaboration requires the spirit of cooperation and mutual respect. Communication skill is the ability to express many messages/meanings from one context to another context with different ways based on the context of communication (Kalantzis & Cope, 2015). Mastering both skills are beneficial for teacher since those skills will help teachers to prepare and facilitate students to be successful in adapting with the fundamental change in Industrial 4.0 era.®

The mastery of 4Cs makes the teachers not only competent but also capable (Hase, S. & Davis, L., 1999). Besides having the high level of criticality, the teachers are also motivated to be creative, know the effective learning, have high self-efficacy level, be able to use the competency in the new situation or be able to familiar and cooperate well in a team, as well as communicate their ideas correctly and contextually (Hase, S. & Davis, L., 1999). The teachers that have these 4Cs skills will quickly bring the institution to rapidly develop to reach the vision, mission that have been planned.

Based on this background, it is necessary to find an appropriate learning model to be used as a training model for a teacher in mastering critical, creative, collaboration, and communication skills (4Cs) following subject matter taught by the teachers. The four competencies have become the paradigm in developing the 2013 curriculum, but they have not been implemented. This research and development were carried out to find the right learning model for training the teachers in mastering critical, creative, collaboration, and communication skills (4Cs).

Method

In line with the background explained before, the type of this research is research and development since this study mainly aimed to develop the product. The product developed was an appropriate learning model to train the teachers in mastering critical, creative, collaboration, and communication skills (4Cs). The design of development used was ADDIE learning model that is interactive with effective, dynamic, and efficient primary stages. ADDIE model has five steps of activities namely Analysis, Design, Development, Implementation, and Evaluation (Spector, Merrill, Ee, & Bishop, 2014), that can be seen in the following figure.

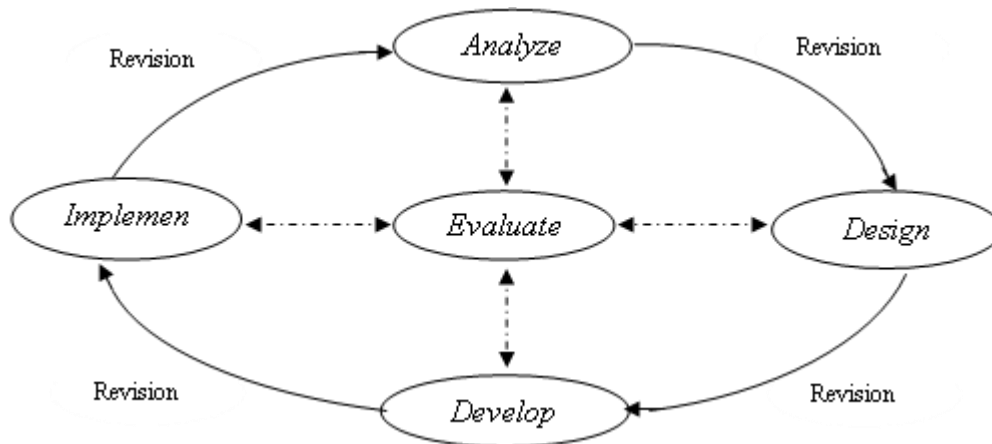


Figure 1. Development Model of ADDIE (Spector et al., 2014)

In the analysis stage, the activity was analyzing initial condition and requirement needed to develop learning model namely analyzing the characteristics of training participants, formulating the goal and target of the training, and analyzing the learning models appropriate for reaching the research goal. The results of the activity in this stage 1 were revised continuously to be adjusted to the need. In the design stage, the design of syntax and learning scenario was done, following the chosen learning model. The design of syntax and learning scenario in this stage is still conceptual that will be the basis of the development process in the next stages. In the developing stage, the workshop was carried out to develop the learning product in each subject. In this initial step, the product was developed for all subjects in the level of Junior High School since Elementary School has different characteristics. In the implementation and evaluation stages, the product that had been developed was simulated in front of experts of learning, and at that time, the team developing the product received suggestions for product repair. The product development reported in this article was a preliminary study so that it has not been implemented in the real condition.©

The data in this research were qualitative data in the form of recommendations, suggestions from experts of learning when the team developing every subject presented and simulated the development product. All data in this research were used as a reference to refine the product developed.

Results and Discussion

In the analysis stage, mapping was undertaken to the initial competency of training participant candidates namely the candidates of teachers of Integrated Excellent School of Tana Tidung Regency for Junior High School level with two types of selection namely selection stage I and II. Selection stage I was carried out by the Department of Education of Tana Tidung Regency under the criteria determined by the Team from Universitas Negeri Malang. Such criteria have good spiritual values, nationalism spirit, high work ethic, commitment to develop Tana Tidung Regency and North Kalimantan, belief in the students' potential, ability to innovate the learning, good-looking, and the age between 25–40.

The selection stage II was executed by the Team from Universitas Negeri Malang. The selection was done by four ways namely, written test, psychology test, interview test, and peer teaching test. The score of each test was accumulated, and the mean was calculated. After getting the score of mean, the second until sixth rank was taken based on the need.©

The mean of the teachers' – the training participant candidates, can be seen in the following figure 2.

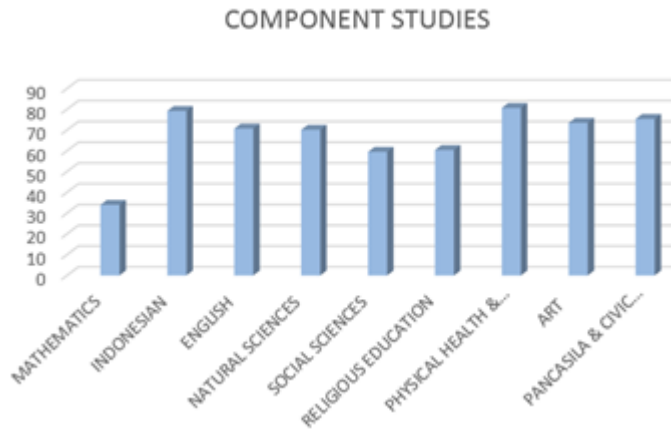


Figure 2. The Mean of Training Participant Candidates' Competency

The goal or target of the training is in order the training participants can design learning activities encouraging the rise of critical, creative, collaboration, and communication skills (4Cs) of the students and plan the project task that can build up the students' 4Cs skills.

In the design stage, Project-Based Learning (PjBL) model that specifically emphasizes on 4Cs (Critical Thinking Skills, Creative Thinking Skills, Collaboration Skills, and Communication Skills) was determined as initial design. This initial design was designed to help the training participant candidates in mastering 4Cs for the subject they are teaching. Therefore, in this design, the material for training in the form of written material about 4Cs was developed. The developer team of each subject in Junior High School level made four materials for training namely (1) critical thinking in Junior High School, (2) creative thinking in Junior High School, (3) collaboration skill, and (4) communication skill. In every material, for this training, was expected to have a description of each skill and the examples of the mastery supporting the development of 4Cs skills. This design stage resulted in four materials for training from nine subjects with detailed information as follow. ©

Table 1. The Material for Training

No.	Subject	Type of material for training			
		Critical	Creative	Collaborative	Communicative
1.	Mathematics	V	V	V	V
2.	Indonesian language	V	V	V	V
3.	English	V	V	V	V
4.	Natural Sciences	V	V	V	V
5.	Social Sciences	V	V	V	V
6.	Religious education	V	V	V	V
7.	Physical and Health Education©	V	V	V	V
8.	Art	V	V	V	V
9.	Pancasila and civic education	V	V	V	V

In the developing stage, the developer team simulated their product in front of experts of learning. The experts evaluated by giving opinion, suggestions, and recommendations. The results of the evaluation from the experts of learning are explained as follow.©

- The training material developed by the developer team of each subject had not fulfilled the demand of 4Cs especially the critical thinking aspect. The examples of critical thinking activities, for example, faced many problems. The workshop participants should repair the

description many times to meet the principle of critical thinking told by Ennis (in Costa, 1991), namely reasonable and reflective thinking focused on deciding what to believe or to do.

- From all things that should be taken into account, the most significant thing was that critical thinking is mainly done to make a decision. Hence, if we want to support our students to think critically, the task given to them should require them to take a decision.®
- The questions to encourage students to think critically should include words, terms, or phrases demanding the students to take a decision. Another important thing is that what should be done by the students to make a decision. It is said that to take the decision, the students should analyze and use reasoning. They should thoroughly study many aspects and use their argument to find out strength/weakness, appropriateness/mistake of the information, and its impacts. The students should make an inference. Therefore, the questions proposed should contain words encouraging them to analyze and use reasoning to take a decision.®
- The third essential thing is that the taken decision is believing or not believing in the truth of a claim/statement/argument or doing the task asked for or not. In short, critical thinking is closely related to decision making related to the truth of a particular statement/claim or validity or invalidity of a specific argument. Critical thinking is also closely associated with decision making pertaining to whether a task should be done or should not.®
- Therefore, one of the ways to motivate students to think critically is that: just present a particular claim/statement/argument, then ask them to analyze and assess the correctness of the claim/statement/argument, and end by asking for their agreement or disagreement to the correctness/validity of the claim/statement/argument. Asking for argument is realized in the form of a question such as: Is it true that....., do you agree if it is said that....., how about you if, those are some questions requiring the students to take a decision.
- Meanwhile, the questions like determine,what does it mean with....., how to determine.....are the questions that less encourage students to decide so that they less think critically.®

Those difficulties inspired the workshop participants to use another point of view. Despite giving special training of 4Cs, it was decided that to provide the training of Project-Based Learning (PjBL) was by emphasizing on the use of 4Cs during the implementation of PjBL. 4Cs were not specifically trained to the participants but modeled in the application of PjBL and the participants were expected to imitate the implementation of 4Cs in their use of PjBL later. The experts called it with the term of Infusing 4Cs into Project-Based Learning.

Finally, the intensive discussion with all developer teams found a new formula of teacher training model to master 4Cs namely **Project-Based Learning (Pjbl) PAPER** with five following syntaxes.

Syntax Project-Based Learning (Pjbl) PAPER

PjBL has special syntaxes known with the term of PAPER that is the abbreviation of the order of the stages of learning using PjBL. As the word of PAPER consisting of five alphabets, PjBL in this research consisted of the following stages:®

1. Presenting a significant issue

In this step, the teacher is the central actor. Teacher shows the crucial information to be the trigger for the students to develop their project. The teacher could present by using video, or perhaps bringing in certain experts. The issue discussed should be relevant to the present condition around the school that enables the students to care of the life around and inspire them related to what they can do and contribute to the society in the future.®

2. Analyzing the existing condition

In this phase, the teacher invites and facilitates the students to analyze the practice happening related to the issue presented in the previous stage. The analysis should use SWOT where the

students are asked to examine the issue from Strength Weaknesses, Opportunities, and Threats. It does not need, of course, to be deep as done by adult people and experts in doing SWOT. That analysis is adjusted to the students' skill.

3. *Planning the project*

In this stage, the students are asked for choosing the project that will be developed. The students should be given a chance to make a plan following their passion and desire as well as their ability. However, the teacher should encourage them to be able to do a beneficial project in accordance with their capacity. The teacher should often ask for and support them to think of their project.©

4. *Executing the project*

The students run the plan they have made. They are asked for completing their project individually although they may work together for their sake. They are motivated to work individually, and when they need to collaborate, they should be encouraged to learn to communicate better.©

4. *Reporting the project*

In this step, the students are asked for reporting the process of the project completion, thinking process, and the product resulted. The main emphasize is not on the project product. The product resulted can be not completed, but the most significant thing is that the idea and thinking that develop during the completion process and all of them should be communicated.©

The learning environment and Project -ased Learning (PjBL) PAPER management system

To make PjBL PAPER run effectively, there is a requirement of the school environment and supportive management system explained as follow.©

- This model of PjBL PAPER is expected can be done simultaneously by all students and teachers in the school. Therefore, the components involved in the implementation of this PjBL PAPER are all teachers, all students, all education staffs, and principals. Even, if it is possible, the implementation of this PjBL can also include the experts outside the school, parents, the representation of business and industrial world, as well as the people around.
- The teachers more position themselves as the facilitator of the forming of 4Cs. Their primary duty is questioning. When the students produce certain idea, both in planning or execution, the teacher should encourage the students to always think again what they have decided, see the weakness and strength, consider the point of view, identify the other partner that will suggest additional value, communicate, and ask for their friends' help to result in better product in both process and result.©
- The student is the initiator of the project. The student is the originator of an idea; all ideas of the project should come from the students so that they become the center of the implementation of this PjBL. From the stage of analyzing, planning, executing, until reporting, the student becomes the center. However, they can consult their teacher or other components in the implementation of this PjBL.©
- Parents, DUDI, experts, can be the resources to make the students' project done more oriented to the expectation and better.
- The education staffs facilitate the students' learning need. The education staffs are expected to provide office stationery, computer completed with the internet, and the permits needed by the students to access and manage the information they need.©
- The principal is responsible entirely for the successful implementation of PjBL optimally.©
- The principle of learning applied in this model of PjBL PAPER is student-centered learning (SCL). The student is the center of the activity. The teacher facilitates the students' learning. Hence, teachers should encourage students to be active in completing their project. When there is a student asks, the teacher should not directly give a single answer. The teacher should give some alternatives, and the students are asked to consider the plus and minus of those alternatives to be decided. The students' questions are responded by the question as well.©

- When the students have resulted in the product or just started the planning and prototype, the teacher's leading role is inviting the students to think again of the resulted product to make it better based on the students' ability. Therefore, when the students show their product, the teacher should challenge them to propose some questions such as: "what if," "what if not," "what about" and the typical questions. The principle is that the teacher should respond to the students' product by challenging them to find a better product.©
- To apply PjBL well, the support of information related to the topic or theme of PjBL is very crucial. Hence, access to the internet (that is safe from inappropriate things for the students) is essential. Therefore, besides the availability of a computer, laptop, or mobile phone with high specification, the expert of information technology that can guarantee safe access for students is also necessary. The students should provide the reading materials such as magazine, newspapers, and articles that are in line with the theme of PjBL.
- If it is possible, the availability of the experts that are in accordance with the theme of PjBL is the ideal thing. They can be the learning source for the students and teacher to explore information to help them in developing their imagination.
- The last is the access to the resources out of school possibly needed by the students to finish their project should be provided and coordinated by the school. The school should provide the transportation device to take the students from and to the source of information for the sake of the implementation of this PjBL.©

Conclusions

This research and development were carried out to find out appropriate learning model for teacher training in mastering critical, creative, collaboration, and communication skills (4CS) in Integrated Excellent School of Tana Tidung Regency, North Kalimantan. The preliminary study found the formula of right learning model to help teacher in mastering 4Cs namely Project-Based Learning PAPER, with the following 5 syntaxes: (1) presenting a significant issue, (2) analyzing the existing condition, (3) planning the project, (4) executing the project, and (5) reporting the project. The 4Cs in the PjBL PAPER were not specially trained for the participants but were used as examples, and the participants can imitate the application of these 4Cs in the implementation of their PjBL. The 21st-century skills (4Cs) were infused into PjBL learning. Project-Based Learning PAPER was proven to help teachers in mastering 4Cs easily.

The product development reported in this article was the preliminary study and will be implemented in the real condition.

Acknowledgments

The gratitude is delivered to all initiator teams of Integrated Excellent School of Tana Tidung Regency, North Kalimantan that have worked hard to make grand design and realize it seriously and sincerely. May Allah SWT always gives His guidance so that all things that have been planned can be implemented well and provide benefits for the people in Tana Tidung Regency, North Kalimantan. We would thank the head of LP2M that has encouraged us to put forth one of the development results in the Integrated Excellent School of Tana Tidung, North Kalimantan namely the Development of Learning Model of Project-Based Learning PAPER in an article and it is presented in the scientific forum namely International Conference on Education, Social, Sciences, and Humanities.

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