Research-based Lectures to Improve Students' 4C (Communication, Collaboration, Critical Thinking, and Creativity) Skills

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Abstract—Research is an appropriate means to bridge students' academic abilities with problems that occur in society. Students will learn to actualize all the abilities that he has while taking higher education. In addition, research can be used to improve students' 4C capabilities (communication, collaboration, critical thinking, and creativity). This ability will produce satisfactory research results, marked by solutions provided by students in solving problems in the field. The data used in the study are the results of questionnaires distributed to students. The results of the analysis of the questionnaire were used as a preliminary design to compile a research-based syntax of learning. The initial design was trialed and the results were seen in developing the ability of 4C students. The students demonstrated the improvement in their ability to select, formulate, and communicate the research projects.

Keywords—collaborative skills; communication skills; creativity skills; research-based lectures; critical thinking skills

I. INTRODUCTION

Globalization that occurred in this century resulted in changes in the overall life of society, including the education sector. In this era, education must be able to develop the desired abilities in the 21st century. This is explained in BSNP, 2010, namely: (a) critical thinking skills and problem solving; (b) the ability to communicate and cooperate; (c) the ability to create and renew. Based on the series it can be concluded that the abilities that must be developed include critical thinking, communication, collaboration, and creativity. Then Insyasiska, argue that “Education in the 21st century aims to build students' intelligence capabilities in learning so that they are able to solve problems around them” [1]. Based on these explanations it can be understood that the skills taught and must be mastered by students aim to solve problems that exist in the community.

Education in the 21st century must be able to form competent students to be able to meet the demands of the development of science and technology. Competencies that must be mastered by students include 4C abilities (communication, collaboration, critical thinking, and creativity). Students must hone skills and improve learning to be able to overcome global challenges, such as critical thinking skills, the ability to communicate effectively, innovate and solve problems through negotiation and collaboration [2]. Therefore, innovations in various educational methods and models must be developed. In this case a learning model needs to be developed that can accommodate these four capabilities (communication, collaboration, critical thinking, and creativity), including research-based learning. Learning with a project-based model will be able to develop 21st century skills significantly [3].

Research is about addressing or asking and answering a question or solving problem [4]. In the theory provides keywords about research, which raises a question (addressing issue) and how to answer and solve the problem (solving problem). Research is a way to get answers to social theories and / or symptoms [5]. Based on this theory, it can be understood that research is a medium for developing student knowledge and media actualization, understanding concepts with factual problematic problems that are spread in the community. Students are required to master various concepts, theories, materials in the world of lectures, it will feel useless if there is no actualization media provided from these cognitive abilities.

The ability to communicate and collaborate is important because students are required to be able to be part of the community. This is very reasonable because in social life there will be various kinds of problems that students must criticize and wait for an appropriate solution to solve the problem. Solutions will be designed and implemented by people who are creative and able to think critically. Creative individuals will be able to develop the ability to generate creative and original ideas, and determine strategies for learning [6]. Students must be triggered to think outside of their existing habits by involving new ways of thinking. Then given the opportunity to convey new ideas and solutions, and submit allegations of answers. These skills can be improved and optimized by doing research, research conducted through careful and perfect investigation of a problem [7].

Research is a vehicle that can be used optimally by students to participate in solving problems that are spread in their environment. With research / research will reduce/eliminate the paradigm of smart students theorizing but minus infeld practice. This has become a challenge for the world of higher education, because it is very unfortunate to only form theorists.
Reality in the field shows this, too many students are clever in theory or concept, but when faced with real problems, they are less able to contribute to making a solution. Researchers are people who think objectively so as to assess problems from various perspectives that are able to provide solutions objectively as well. This expectation can be realized by fertilizing the research activities carried out by students while undergoing higher education. Through research activities, they will be accustomed to providing objective solutions so that they can become the hopes of the whole community and be useful in the world of work.

II. METHOD

The study uses descriptive qualitative methods that focus analysis of the data obtained, namely questionnaire data. Bogdan describes the characteristics of qualitative research, namely, 1) using the natural environment as a direct source of data, 2) descriptive analytical nature, 3) research pressure on the process not on results, 4) inductive, and 5) prioritizing meaning [8]. Primary data came from a questionnaire distributed to 250 students from various departments and faculties at the Indonesian University of Education. The questionnaire includes ten questions submitted to students. The questionnaire basically asks about the experience of students in research, the urgency of research-based learning, the hope of learning that is carried out, the purpose of taking higher education, etc. Based on the results of data analysis, then the syntax of research-based learning models was formulated. The next step, the syntax is tested to determine its effectiveness in improving the ability of 4C students.

III. RESULTS AND DISCUSSION

A. Research-Based Lectures to Improve 4C Skills

(Communication, Collaboration, Critical Thinking, and Creativity) Students

Research is a way to get answers to assumptions about problems that have sprung up in the community, both in the education community and in problems in society at large. Research is a systematic investigation to find answers to a problem. The point is to answer a question or problem that exists with systematic steps. In this case there is a meaning, that research is a way to arrange a solution to the existing problematics.

Webb et al. states that "Research skills help graduates to critically investigate problems and if appropriate produce and evaluate relevant data, test ideas, theories, and hypotheses, and successfully guide the way for them to navigate the sea of information that characterizes information age" [9]. Writing a scientific work in it involves a process of scientific thinking. In an effort to support this, the skills that need to be trained by students are research skills. "Research skills are skills in conducting scientific research in the framework of scientific truth seeking by applying scientific methods that rely on proven scientific reasoning" [10]. Students as community intellectuals must understand that problems in society are very diverse and complex, and sometimes not explained in concepts, theories, and / or material that has been obtained. Based on these theories, it can be concluded that research is an academic activity that seeks to explore problems with clear research steps to solve a problem. In essence, research is an academic activity to synthesize cognitive abilities possessed and developed by researchers with problems that are spread in the environment.

Research is also a bridge for students to develop abilities that demand to be mastered. These capabilities include communication, collaboration, critical thinking, and creative spirit. It can also be categorized into life skills that must be owned by anyone, especially students, to be able to compete in the workforce. This is illustrated by Triling in table 1.

<table>
<thead>
<tr>
<th>TABLE I. LEARNING AND INNOVATION SKILLS [3]</th>
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<tbody>
<tr>
<td><strong>21st Century Skills</strong></td>
</tr>
<tr>
<td>Learning and Innovation Skills</td>
</tr>
<tr>
<td>2. Communication and collaboration; students are able to communicate clearly and collaborate with other members.</td>
</tr>
<tr>
<td>3. Creativity and innovation: students are able to think creatively, work creatively and create new innovations.</td>
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</table>

Based on this explanation, it can be understood that research is a way out for students to develop language skills that must be mastered in the digital age now, such as the ability to communicate, collaborate, be able to think critically, and have a creative spirit in order to determine and develop practical solutions. "Research is carried out through careful and perfect investigation of a problem" [7]. In an effort to succeed this must be designed a learning step that is integrated with research. The following is a syntax of research-based lectures to improve students' 4C capabilities (communication, collaboration, critical thinking, and creativity).

1) Selection of research problems (background, problem formulation, and research objectives): Lectures begin by determining the problems each group will try to solve. The problems presented can be determined by the teacher or discussed directly with students. However, in this model it is more recommended that problems be discussed with students. It aims to hone students' critical thinking to determine the problems that will be solved by the group. From this, the attraction is also expected to appear to solve the problems that they have set themselves. These assumptions are very reasonable because students determine the problem, so from the outset, alternative solutions are expected to be made to solve the problems raised.

In this case, the instructor/lecturer is only tasked to facilitate the thoughts that emerge from the students' critical power. The lecturer directs the substance matters, so that the way of thinking of students is not too broad, so that they discuss matters outside the research that will be conducted. After getting the problem to be discussed, then students develop the background of the research conducted. The background is factual and objective, usually starting from
unrest, not between expectations and reality. Patterns of background development must be adapted to rules and academic ethics, at a minimum it must include supporting theories that can strengthen the opinions of the author (student). This is also a demand for students, besides having to be able to think critically in determining problems and alternative solutions, they are also directed to think like an academic community.

This first phase is a very important phase for students to understand, because it determines the preparation of the next steps. It can also be said that this phase is the heart of a study, because each study begins with problems that arise in the community. From this, a research title can be formulated that matches the problems raised and the solution is to be prepared. In addition to the research background, establishing the research problem formulation will be the focus of this section. The research problem formulation will determine the types of data to be sought and the data collection instruments to be used.

2) Selection of supporting theories to formulate alternative solutions parameters: After completing the introduction, the next step is to determine the theories that can support the research. Supporting theories are very dependent on the determination of the research title and background that are listed, so this section depends heavily on conformity in the introduction. This is related to the characteristics of systematic scientific writing, as explained by Kusnandar "Research or research is an investigation activity carried out according to a systematic scientific method to find scientific information ..." [5]. In addition, supporting theories will be used as a reference for compiling a data collection instrument, namely compiling instrument parameters. Instrument parameters are very important part because each point included in it is the result of understanding and analysis of the theories listed. So, the preparation of parameters remains within the scope of the research conducted.

3) Develop evidence of research / research originality: At this stage, students will be guided to compile a proof of the originality of the research conducted. This is no less important than the other sections, because in this section students will risk their research as being original or imitation of existing research. Why should the evidence of research originality be included? This assumes the effectiveness of research, not to let students do research that has been researched by others, it is a futile job. The way to compile evidence of research originality is to include previous studies that are almost similar to the research that will be conducted.

Previous research that was included and then analyzed to look for significant differences with the research to be conducted. Based on the results of the analysis then compared with the research that will be conducted, the similarities and differences are explained. So that there will be evidence of research originality if the results of the analysis with previous studies are stated differently. This is in accordance with academic ethics and the ethics of scientific writing, because it is not permitted to steal the ideas / results of research belonging to others.

4) The research methodology used (research methods, research instruments, data collection instruments, etc.): The next stage is the research methodology. At this stage there are actually many things that can be included in relation to the research conducted, for example the location of research, operational definitions, population and samples (if quantitative research), research findings (if learning research), research data processing, etc. Of the many things that can be included, there are several things that must be understood and mastered by students, namely research methods, subjects, research instruments, and data collection instruments.

The research method that is determined is very dependent on the type of research and the data to be sought, so this part is very dependent on the determination of the title and formulation of the research problem. If research related to numbers is identical to quantitative research. While research with analysis, studies are identical to qualitative research. But this is not a benchmark for research, basically it is still associated with the purpose of research and the type of data needed. This must be understood by researchers/students because of errors in determining the type of research will make it difficult for students to process data and discuss the data.

The research instrument that will be determined by the student/researcher is very dependent on the formulation of the problem listed earlier in the introduction. Each formulation of the problem set will produce a research instrument that is needed, for example test instruments, observations, questionnaires, interviews, etc. Determination of research instruments will affect the type of data collection instrument needed, so that this part is bound together. Data collection instrument is the result of representation of the research instruments that have been determined. Data collection instrument is a tool used by students to collect data in the field.

5) Formulate practical solutions: This stage teaches students to develop and implement solutions that have been designed. Students learn to make solutions based on data that has been obtained in the field. The data is real evidence of the problems that occur in the field, so data collection must really be done and without intervention. Data is the most important part of developing solutions that are thought to solve problems that occur in the field. The proposed solution must be practical, this is so that the solution can directly address the problem at the core of the research. Practical solutions are the result of critical thinking and creative thinking, because solutions are still found in the results of research that are still "wishful thinking". This will have an impact on solving problems that have not been resolved. In practice, this stage will show the results of critical thinking, collaboration, creativity, and communication of each group member with the research objectives.

6) Conclusions and recommendations: The final stage of the research is to explain the conclusions of the study from the beginning to the discussion previously described. So that the conclusions will appear to be achieved or not the research that has been done. In the conclusions section, the ability of students to process words will appear. Broadly speaking, the
conclusions section seeks to provide an explanation and understanding to the reader in connection with the formulation of the problem that has been answered in the previous section. But basically, the explanation in conclusions is not in the form of points, but an overall explanation.

Another important part of the rest is recommendations. In this section (recommendations) students try to provide further research opportunities that can be implemented by themselves or by others. In other words, recommendations are the last stage that try to provide information that based on the research that has been done can be followed up with various other things.

A shorter explanation of the learning syntax is shown in table 2. Each syntax consists of lecturer activities, student activities, and achievement targets from 4C.

<table>
<thead>
<tr>
<th>No.</th>
<th>Syntax Learning</th>
<th>Lecturer Activity</th>
<th>Student Activity</th>
<th>Achievement 4C Target</th>
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<tbody>
<tr>
<td>1.</td>
<td>Selection of problems Research</td>
<td>Guiding</td>
<td>a. Discussion b. Develop research problems, the urgency of research, basic assumptions c. Design an initial alternative solution</td>
<td>a. collaboration and communication b. critical thinking c. creativity</td>
</tr>
<tr>
<td>2.</td>
<td>Selection of Supporting Theory</td>
<td>Guiding</td>
<td>a. Discussion b. Determine supporting theories c. Formulate solution parameters</td>
<td>a. collaboration and communication b. critical thinking c. creativity</td>
</tr>
<tr>
<td>3.</td>
<td>Proof of Originality of Research</td>
<td>Guiding</td>
<td>a. discussion b. determine previous studies c. compile evidence of research originality</td>
<td>a. collaboration and communication b. critical thinking c. creativity</td>
</tr>
<tr>
<td>4.</td>
<td>Research Methodology</td>
<td>Guiding</td>
<td>a. discussion b. understand the research methods used. Suitability of data collection instruments with data needed in the formulation of the problem</td>
<td>a. collaboration and communication b. critical thinking</td>
</tr>
<tr>
<td>5.</td>
<td>Discussion of Practical Solutions Guiding</td>
<td>Guiding</td>
<td>a. implementation of practical solutions</td>
<td>a. collaboration, communication, critical thinking, and creativity</td>
</tr>
<tr>
<td>6.</td>
<td>Conclusions and Guiding Recommendations</td>
<td>Guiding</td>
<td>a. discussion b. give conclusions c. research recommendations</td>
<td>a. collaboration and communication b. critical thinking c. creativity</td>
</tr>
</tbody>
</table>

IV. CONCLUSION

Today's education must be able to answer global challenges and needs in the world of work. In the 21st century, education must produce outcomes that have competencies that are in accordance with the demands of the times. Competencies in question include 4C capabilities (communication, collaboration, critical thinking, and creativity). The development of these capabilities can be accommodated in research-based learning models. Research is a means for students to learn to respond to factual problems in the field and develop practical solutions to overcome these problems. In the process of drafting a solution it will require 4C capabilities, so that getting used to doing research will increase the ability of 4C. Research is a solution to develop the ability of 4C students, because research is a systematic activity to produce solutions. Students who are skilled in 4C abilities will show quality research results.

REFERENCES