The ability of elementary teacher candidate in developing material learning oriented to the scientific approach

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Abstract. The scientific model is one of the learning models that embrace constructivism theory. This can be explained because the scientific model always strives for learners to discover knowledge and then construct in their own minds through scientific activities. This study aims to determine and describe the ability of STKIP Subang students in developing learning tools scientific approach that is done with the pattern analysis document or called content analysis, or information analysis. Based on the exposure and discussion it can be concluded that the ability of prospective teachers in developing scientific learning tools is dominated in the medium category, both in the development of lesson plans (RPP), teaching materials and scientific student worksheets. From the results of this study, it is necessary to develop the ability of prospective student teachers in STKIP Subang in developing scientific learning devices.

1. Introduction

STKIP Subang is one of the universities assigned by the government to create and develop educational staff, including qualified and professional teachers. Therefore, STKIP Subang continues to strive for educational services for every existing student, so that the task can be achieved. The service quality improvement service for students is intended to prepare prospective students to have a good stock so that they are ready to implement the knowledge they have in society.

Efforts to produce professional educators as described above, based on the vision STKIP Subang is to produce educators for elementary school teachers are professional based on the education of character and have a high character and character. While the mission to be achieved is: (1) to produce professional graduates in applying science in the primary education sector as highly skilled educators and have strong character, (2) to organize the Caturdharma of Higher Education for the achievement of graduates of elementary school teachers who can compete in developing the application of science and the profession to meet the needs of the community, through the institutional performance of the autonomous and healthy, (3) cooperate with the basic education units in developing relevant science and technology; (4) organize education and learning to produce education in the field of PGSD education of prospective elementary teachers) capable of performing tasks according to the paradigm development of PGSD services in quality, professional and able to compete in national and international level, and (5) doing research and development of basic education discipline in particular, and (6) in PGSD as one of the reform movement especially in the field of basic education.
The vision and mission of STKIP Subang as described above can give birth to a competent and professional graduate. This is in line with the graduate profile expected by the campus that is competent in solving teacher problems and education science through a careful analysis both in national and international context, competent in planning and development of teacher education and education in harmony with local environmental context and condition, expert in research/experiment teacher and education science, have professional ability with hand on experience in teacher. To achieve the graduate profile standard, the courses to be followed are related to the ability to develop learning tools, among others: (1) learning development, (2) learning planning, (3) development of teaching materials, (4) instructional innovation, and (5) evaluation of learning.

In line with the implementation of the 2013 curriculum, that the implementation of learning should emphasize the scientific approach. The scientific approach according to the Regulation of the Minister of Education (Permendikbud) number 103 of 2013 is a scientific-based approach that is the organizing of learning experiences in a logical order [1]. As explained in the attachment of the Minister of Education and Culture of the Republic of Indonesia Number 103 of 2014 the process of learning by scientific approach includes five learning experiences: observing, asking, trying, associating and communicating [2]. This scientific approach is implemented by using direct or indirect learning mode as a foundation in applying various strategies and learning models in accordance with the basic competencies to be achieved.

The scientific model is one of the learning models that embrace constructivism theory. This can be explained because the scientific model always strives for learners to discover knowledge and then construct in their own minds through scientific activities. Scientific activities in scientific models for example; observe, collect data, analyze data, communicate and so on. Through these scientific activities learners are expected to take meaning so as to be able to apply in their daily life both in the present and in the future. This is in accordance with the [3] Minister of Education's regulation no. 65, 2013 on Process Standards, the scientific approach is carried out with the following steps: (1) observing, (2) asking, (3) attempting, (4) associating, and (5) communicating and adding (6) creating.

According to Carol and Diane [4] scientific models would be given to pupils ready-to-wear in the form of accurate meanings. Formerly, as a kid contributes in a discovery action, the mature vocally maps the model then description of the experience. Regularly, with such spoken arbitration of practices using systematic jargon, a kid assumes the models so by way of to monitor added theoretic knowledge. In practice students are required and required to conduct a series of activities of a scientist that is using scientific measures. The series of scientific steps are: 1) formulate the problem, 2) propose the hypothesis, 3) collect the data, 4) process and analyze the data, 5) make a conclusion.

According to Bill Cope et al [5], liability science includes rational and temporary in the specific customs of a researcher in a situation of located thought.

And also that some principles of scientific model in learning activities are as follows: (1) student-centered learning, (2) learning to form students self-concept, (3) learning avoid verbalism, (4) learning gives opportunity to students to assimilate and accommodate concepts, laws, and principles, (5) learning encourages the improvement of students' thinking skills, (6) learning improves student learning motivation and teacher's teaching motivation, (7) provides opportunities for students to practice communication skills (8) the process of validation of concepts, laws, and principles constructed by students in their cognitive structure.

Referring to the above explanation, it can be understood that scientific learning has some special characteristics. Experts create annotations to study nearby the creation [6]. Remark is important to altogether systematic action then to all systematic self-controls. On the superficial, systematic remark is dishonestly humble: Occurrences occur, wonders are experimental, and wonders are chronicled. So that the characteristics of scientific learning are as follows: 1) objective, meaning learning is always done on certain objects and students are conditioned to give an objective assessment of the object, 2) factual, meaning learning is always done on factual issues that occur around students, 3) systematic, meaning learning is done on the learning stages of the systematic and learning stages that serve guidelines implementation of learning, 4) has a method, meaning implemented based on certain
scientific learning methods that have been tested effectiveness, 5) carefully, meaning learning is done to read accuracy and accuracy of students in studying a particular phenomenon or object of learning, 6) logical, meaning that learning always raises things that make sense, 7) actual, meaning that learning always involves the meaningful context of childhood learning resources.

One of the most important things in learning and teaching activities is learning tools. Learning tools are a number of materials, tools, media, instruction and guidelines to be used in learning activities. Instructions resources essential to be satisfactory and obtainable, so that unsighted then near sighted pupils can effort organized [7]. Instruction resources are sequences of education, curriculums, program notices or leaders, manuals, study reports, program newsletters, producers' guides, then extra resources which serve an educator education meaning [8]. The tool is a key element in the field of education and is one component to the quality of education [9]. Based on the description, the preparation of a good learning tool is expected to help improve the quality of education.

Learning Tool Learning planning is designed in the form of Syllabus, Learning Implementation Plan (RPP) which refers to the standard contents and student activity sheet. Lesson planning includes preparation of learning implementation plan, media preparation and learning resource, learning appraisal tool and learning scenario. (a) Syllabus, Syllabus is a reference for the preparation of learning framework for each subject matter study, (b) Learning Plan (RPP), is a plan of face-to-face learning activities for one or more meetings. RPP is developed from the syllabus to direct the learning activities of learners in an effort to achieve Basic Competence (KD). Every educator in the educational unit is obliged to develop a complete and systematic RPP for learning to be interactive, inspirational, fun, challenging, efficient, motivating learners to participate actively, and providing sufficient space for initiative, creativity and independence according to the talents, interests and physical and psychological development of learners. The RPP is based on the KD or sub-theme held in one or more meetings. (c) Student Activity Sheet, Student Activity Sheet aims to assist learners to find concepts. Student Activity Sheet contains instructions that guide learners in the process of solving a problem [8].

Referring to the above description, the teaching materials and learning tools are very important in the learning process. Learning tools will greatly affect the student learning outcomes. The better the tools both learning devices used by teachers in teaching the more optimal learning implementation. Optimal learning process of course will encourage the achievement of optimal learning results as well. This is in line with the results of research Darling-Hammond [10], and Berry and Driel [11] declared that a significant influence of educator teaching is its expansion of educators’ aptitudes to inspect education after the standpoint of beginners who transport varied involvements then edges of orientation to the schoolroom. Furthermore, current prospectuses for discipline educator teaching frequently purpose at cooking discipline educators to strategy and examination curricular resources [12]. Therefore, the research aims to find out how the level of ability of prospective teachers in STKIP Subang in developing learning tools.

2. Method
This research uses a quantitative approach with descriptive survey method, i.e. research done with the aim to create a picture or description of a situation objectively. The description or event that will be described in this research is the ability of STKIP Subang students in developing learning tools. The numbers of prospective teachers who become samples in this study as many as 44 people with various disciplinary majors. Research is done by pattern analysis document or called content analysis, or information analysis. In addition, this study is also often called the survey of records research. This is in line with the opinion of Glasow [13], that survey study usages a designated helping of the populace after which the conclusions can future be widespread spinal to the populace. So that that research survey conducted by reviewing the work can be called the survey of records, because in this research activities use a lot of sources in the form of notes or non-reaction information. Surveys canister similarly be second hand to measure wants, appraise request, and scrutinize influence [14].

The documents analyzed in this research are in the form of, the implementation plan of learning, teaching materials, and worksheets of students that have been made by prospective teachers during the
implementation of the practice of learning in school. Assessment of learning tools are grouped into "excellent", "good", "fair", "less" and "very less" categories. The instrument used to determine the category is developed based on the characteristics indicator of each tools with the same maximum total score. Thus, each device type uses different instruments. Each instrument consists of 20 statements (associated with the indicator), therefore each type of learning device will have a maximum score or score of 20 points.

3. Results and discussion

3.1. Research data

3.1.1. Ability of students of STKIP Subang teacher candidates in developing lesson plan. The learning implementation plan that has been collected from the respondents during the implementation of PPL in 2015-2016 and 2016-2017 amounted to 44 learning plan. The learning plan is analyzed, generally the percentage of the student's score can be seen in Table 1.

| No | Interval Score | Category | Respondent | Percentage |
|----|----------------|----------|------------|------------|
| 1  | 76% < % ≤ 100% | High     | 9          | 20.45%     |
| 2  | 51% < % ≤ 75%  | Medium   | 21         | 47.73%     |
| 3  | 25% < % ≤ 50%  | Low      | 14         | 31.82%     |
|    | Total          |          | 44         | 100%       |

![Figure 1. Student Ability Bar chart in developing scientific lesson plan.](image)

Based on Table 1 and Figure 1 above seen 21 respondents or about 47.72% of prospective teachers STKIP Subang students have the ability to develop a lesson plan with the category "medium". Furthermore, 14 people or about 31.81% of students have ability to develop lesson plan with "low" category and the rest counted 9 people or about 20.45% "high".

3.1.2. The ability of prospective teachers in developing teaching materials. Based on the analysis of data that has been collected (in the form of documentation of teaching materials developed by students), either in the form of handouts, modules, brochures and so on, then the ability of prospective teachers STKIP Subang in developing teaching materials can be seen in Table 2.

| No | Interval Score | Category | Respondent | Percentage |
|----|----------------|----------|------------|------------|
| 1  | 76% < % ≤ 100% | High     | 8          | 18.18%     |
| 2  | 51% < % ≤ 75%  | Medium   | 26         | 59.09%     |
| 3  | 25% < % ≤ 50%  | Low      | 10         | 22.72%     |
|    | Total          |          | 44         | 100%       |
As in Table 2 and Figure 2, it can be seen that in general the ability of prospective teachers in STKIP Subang in developing teaching materials are in the category "medium", that is as many as 26 people or about 59.09%. Students who have the ability with the category "low" as many as 10 people or about 22.72%, while the prospective student teachers who have the ability to develop teaching materials with the ability "high" as many as 8 people or about 18.18%. Thus it can be said that the average student prospective teachers in STKIP Subang relatively not satisfactory.

3.1.3. The ability of prospective students in developing Student Worksheet. Based on the analysis of data that has been collected (in the form of documentation worksheet scientific Approach developed by students), then the ability of prospective teachers STKIP Subang in developing worksheet scientific Approach can be seen in Table 3.

| No | Interval Score | Category | Respondent | Percentage |
|----|----------------|----------|------------|------------|
| 1  | 76% < % ≤ 100% | High     | 9          | 20.45%     |
| 2  | 51% < % ≤ 75%  | Medium   | 25         | 56.81%     |
| 3  | 25% < % ≤ 50%  | low      | 10         | 22.72%     |
|    | Total          |           | 44         | 100%       |

As in Table 3 and Figure 3 it can be seen that in general the ability of prospective teachers in STKIP Subang in developing student worksheet is in the category "medium", that is as many as 25 people or about 56.81%. The students who have the ability with the category of "low" as many as 10 people or about 22.72%, while prospective students who have the ability to develop teaching materials with the ability "high" as many as 9 people or about 20.45%. Thus it can be said that the average student prospective teachers in STKIP Subang in developing student worksheet relative not satisfactory as ability in developing teaching materials.
3.2. Discussion

Based on the data presented above, shows that the average ability of prospective teachers in STKIP Subang in developing learning device tools (lesson plans, assessment instruments, teaching materials and student worksheets) are classified as "medium".

The ability of students of STKIP Subang in developing RPP can be seen in Table 1 and Figure 1. Based on the table, it is seen that the prospective teacher students have different ability. From the guidance documentation of assessment of RPP known that the student has not refer to the regulation of education and culture minister no 22 of 2016 about process standard. Should be in making a good RPP students must follow the standard development of RPP as described in the Material Regulation No. 22 of 2016 [15] on the standard process. The core competencies and competency standards should be quoted from the quoted from ministerial regulations as national education standards, indicators of achievement of competencies quoted from the syllabus, the overall objectives of meeting the competence requirements contained in the word of the use in basic competence, the purpose of meeting the competency level, the minimum goal of basic competencies developed exceed the minimum in accordance with the potential and needs of students, goal formulation includes two aspects, namely the level of basic competence and learning materials, the assessment is described on assessment techniques, instrument form, and instruments used, procedures and instruments assessment process and learning outcomes tailored to indicators of achievement of competence, lists the items to be used in the assessment, lists the key answers, and there are guidelines for assessment.

According to Darling-Hammond et al [16] the aptitude to bring into line teaching that encounters the criterion’s drives, speeches pupils’ wants, then imparts discipline-specific gratified is not inherent but necessity be clearly trained, as a teacher should be able to develop a lesson plan that is not only good but also able to provide opportunities for learners to seek, build, form and apply knowledge in their life. A teacher should try to improve his ability in making syllabus, the following can be done by teachers to put quality in making syllabus: Syllabus should be made with the standard of making syllabus which has been determined by education ministry or at least pay attention to characteristic of student learners in developing competency achievement indicator that are relevant to the learner. In order for basic competence can be fulfilled then the learning activities should be adjusted to the learning activities and indicators.

In the development of teaching materials, the ability of teachers still need to be improved, as seen from several circumstances, namely: (1) the type of teaching materials, most types of teaching materials developed by students is the student worksheet. Other teaching materials, such as modules, hand out, leaflets and so on are not yet available. Therefore, in the process of student learning, teacher candidates are still dominant using teaching materials in the form of instruction manual (textbook), (2) the quality of teaching materials, the quality of teaching materials developed by prospective teachers still needs to be improved. Some weaknesses of teaching materials developed, among others, there are writings that are not in accordance with the rules of scientific writing, there are ambiguous sentences, the problem used has not paid attention to the rules of good writing and so forth [17].

In addition, in the development of teaching materials as intended, the students experience obstacles, namely the constraints found in making the assessment instrument, for example: having difficulty in making questions and answer choices, having difficulty in finding the source or reference used, the students do not make lattice- lattice matter and about evaluation. The evaluation question used comes from the package book or Student Worksheet [18]. In addition, in conducting the assessment most of the students are not guided by the principles of assessment, so that when making the question of student evaluation does not pay attention to the material; language; and construction, such as the lack
of clear instructions on how to do the problem well, the absence of scoring guidelines, and tables, drawings, or graphics are not presented clearly.

Students of STKIP Subang teacher candidates do not have good ability in making and developing learning tools. This means that students do not have basic skills and sufficient knowledge in making lesson plan. These skills include adequate learning activities, media suitability and methods, as well as adequate evaluation tools. Students cannot be consistent in citing competency standards, basic competencies, and indicators of the syllabus. The function of planning is a very important function for a teacher. Teachers will teach effectively when always planning before teaching. With the preparation of teaching, the teacher will be steady in front of the class. Mature planning can lead to many creative initiatives and creative power while teaching, and can improve the interaction of teaching and learning between teachers and students [19]. So that the teacher must understand and skilled in planning, both plan goals and competencies to be achieved, and plan the learning process so that the learning process can be done well. An assessment plan contained in an RPP, if the planning is not good then it can be ascertained the result is not good anyway. As a prospective educator, students need to pay attention to the manufacture and development of lesson plan.

It is expected that from each of the above disclosures, students as prospective teachers can maximize teacher competence, especially in assessing student learning outcomes for the sake of learning. Teachers' expertise in the development of lesson plans, development of teaching materials, student worksheets and student achievement assessment instruments have a broad impact. Each of these components will assist teachers in optimizing students' self-development.

As a prospective teacher who will become a professional teacher, should have a good ability and in conducting the learning process must be in accordance with the National Education System that has been established in the Law of the Republic of Indonesia No. 22 of 2016 [20] which contains the standard process and standard of educational assessment in the context of the 2013 national curriculum is by scientific approach. With the implementation of the learning process in accordance with standard process and education assessment standards, then the national education objectives can be achieved.

4. Conclusion and recommendations

4.1. Conclusion

Based on the exposure and discussion it can be concluded that the ability of prospective teachers in developing scientific learning tools is dominated in the medium category, both in the development of lesson plans, teaching materials and scientific student worksheet. The situation is due to some obstacles such as student’s difficulties in finding referrals that will be used in embedding scientific learning devices and still at least information about science-based learning approach.

4.2. Recommendation

From the results of this study, it is necessary to develop the ability of prospective student teachers in STKIP Subang in developing scientific learning devices. Capacity development can be done through debriefing ahead of field practice or through subject discussion. With the development of the ability in developing learning tools students are expected to prospective teachers from STKIP Subang ready to become a professional teacher.

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