

The Analysis of Pre-service Teachers' Pedagogical Content Knowledge (PCK) in Terms of Grade Point Average (GPA)

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Abstract—The study aims to describe and to analyze pre-service teachers' pedagogical content knowledge (PCK) in terms of grade point average (GPA) in Faculty of Educational Sciences and Teachers Training, Siliwangi University. The study used the descriptive qualitative method and involves 97 pre-service teachers from the class of 2014 as randomly taken subjects. Data collection by using observation, questionnaire, and literature study. The instrument using PCK questionnaire, validated by 2 educational experts. The study concluded that students' PCK understanding as many as 2.06% are in the high category, 97.94% are in the medium category, and 0.00% in the low category. Whereas the pre-service teachers as many as 38.14% are in high GPA, 49.48% are in moderate GPA, and 12.37% are in low GPA. The pre-service teachers in high category and high GPA can understand PCK on each indicator: insight and educational foundation, learners, curriculum and syllabus, lesson planning, learning implementation, technology in learning, learning outcomes evaluation, and students' development to actualize their potential. While pre-service teachers in low GPA do not understand PCK thoroughly on each indicator. Some indicators that have not been understood are learners, curriculum and syllabus, and evaluation of learning outcomes. Some pre-service teachers in high GPA have moderate PCK understanding, whereas in low GPA have high PCK understanding.

Keywords—pedagogical content knowledge; grade point average

I. INTRODUCTION

Education plays the important role in improving the quality of human resources, in order to be able to compete globally. Talking about education is closely related to the learning process at various levels of education. The quality of learning in schools is strongly influenced by the competence of teachers on how to convey subject-matter to learners and mastery of subject-matter to be delivered. Students as pre-service teachers must be equipped to have expertise in the learning process. Success in the learning process is determined by the teacher.

The learning process is at the core of the educational process, where teachers have the most important role in teaching and learning. Teacher pedagogic competence is the main competence teachers must have in implementing an effective and dynamic learning process. As stated by [1] providing instruction and practice to build pedagogical knowledge and skills with fewer focus on content knowledge is the objective of the program. When the program is completed, it is expected that the pre-service teachers will have knowledge, skills, and attitudes needed to be the good beginner teachers.

The learning process is a complex activity, not just conveying knowledge to learners but many activities and actions that must be done. One of the basic skills that are important to the teacher is the ability to plan and implement the teaching and learning process, thus it is certain that the student as a pre-service teacher must have the ability. In 1996, The National Science Education Standards and National Research Council [2] integrated the concept of PCK as an important component of science teachers' professional development. The coherence of content and pedagogy is represented by Shulman into an understanding of how we organize, adapt, and represent certain topics, problems, or issues for instruction [3]. This ability equips teachers in carrying out their duties and responsibilities as teachers. The learning process occurs during the interaction between teachers and students to achieve learning objectives. The learning process requires careful planning, which is to coordinate the elements of objectives, teaching materials, teaching and learning activities, methods and teaching aids and evaluation. The next stage is implementing the plan in the form of action or practice of teaching. Further, such knowledge is referred to as PCK. As expressed by Shulman [4] that pedagogical content knowledge is an understanding of the way topics are represented in a way that makes learning easier. Pedagogical Content Knowledge relates to how to do the learning process so that learners understand [5].

Teachers and Lecturers Law Number 14 the Year 2005 explain that an educator must have 4 competencies: pedagogical competence, professional competence, social competence, and personal competence. Similarly, students of important pre-service teacher have the competence. PCK is a combination of content knowledge and pedagogical knowledge [6]–[8]. Understanding of teaching materials and understanding how to educate absolutely must be owned by pre-service teachers. These were obtained by pre-service teachers the from the lecturing materials at the 1st until the 8th semester. One of the parameters of students' understanding of PCK is GPA. GPA is the cumulative achievement value of each semester obtained by the students during the lecturing process that reflects the success rate of students in the mastery of lecturing materials. The material of the recovery consists of content knowledge and pedagogical knowledge. The learning process conducted in the college is still limited to improve the pedagogic content of the students, only limited mastery of teaching materials. Whereas the ultimate goal of the learning process is not only to improve the understanding of the content of teaching materials but also to improve the ability of pedagogical content understanding consisting of insight and educational foundation, learners, curriculum and syllabus, lesson planning, learning implementation, technology in learning, learning outcomes evaluation, and students' development to actualize their potential. The following is a description of PCK according to [6]:

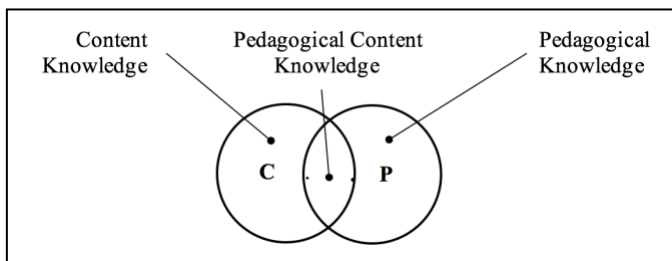


Figure 1. PCKs' Description [6]

To become a professional teacher is not only shown or proven by a professional certificate but must be demonstrated by performance as an educator. Need more innovation[9]

Pre-service teachers do not only master the content (content) and teaching strategies, but also must have a special understanding and ability to integrate knowledge of materials, curriculum, learning, teaching, and students also. Further, such knowledge is referred to PCK as something that has to be owned by the teacher the resulted from the combination between content knowledge and pedagogical knowledge that is merged into one. Shuell and Shulman in [4] formulated that PCK is an understanding of what effective learning methods to describe certain materials, as well as an understanding of what makes certain materials easy or difficult to learn. According to [6] content knowledge includes knowledge of concepts, theories, ideas, the frame of mind, methods of evidence and evidence. Shulman also stated that pedagogical knowledge is related to teaching methods and processes that include knowledge of classroom management, tasks, learning planning and student learning. Pedagogical knowledge is synonymous with pedagogical competence of teachers according to Government

Regulation Number 74 Year 2008, that teacher's pedagogic competence is the ability to manage the learning of learners that includes at least the insight and educational foundation, learners, curriculum and syllabus, lesson planning, learning implementation, technology in learning, learning outcomes evaluation, and learners' development to actualize their potential.

Various studies on the application of PCK had been widely practiced, PCK is an important thing to be developed [10]. One of the various perspectives about PCK sees PCK as an effective learning which includes three components: content knowledge, curriculum knowledge, and teaching knowledge [11]. In addition, according to [12] PCK has four components, that are knowledge of students' understanding, knowledge of curriculum, knowledge of instructional strategies, and knowledge of purposes for teaching. So this implies a close relationship between the way the teacher teaches or pedagogic knowledge with the content of the material being taught. The dimensions of PCK in this study include pedagogic content that must be possessed by students, namely understanding insight and educational foundation, understanding of learners, curriculum or syllabus development, learning planning, teaching and dialogical learning, learning technology utilization, evaluation of learning outcomes, and students' development to actualize various potentials owned. Moreover, a broader concept of PCK is given. PCK is described as teacher's integrated understanding of four components: pedagogy, subject matter content, student's characteristics, and the environmental context of learning [13].

The study is intended to dig a further understanding of PCK of pre-service teachers in terms of GPA. The kind of study has not been done yet in the Faculty of Educational Sciences and Teachers Training Siliwangi University, therefore researchers are interested to conduct the study as an input for the institution in order to prepare students as pre-service teachers ready to enter the field of study.

II. RESEARCH METHOD

This study used the qualitative descriptive method, through the preparation and implementation steps. The preparation step includes: reviewing the theory, observation to analyze needs, compiling questionnaires, and validating the questionnaire, while the implementation step includes: questionnaire distribution, data analysis, and concluding. Subjects in this study are pre-service teachers of the Faculty of Educational Sciences and Teachers Training Siliwangi University year 2014 as many as 97 people, taken randomly. The data are collected using questionnaires, documental studies, and literature studies. The instrument used PCK questionnaire, before being used it was validated by 2 educational experts. Validators 1 and 2 provide the same relative suggestions and inputs that are redactional to each statement, the statement should be concise, solid, clear and can dig every measured indicator. Then the PCK questionnaire was revised according to suggestions and inputs from experts, then validated again and declared eligible as an instrument. The next step of distributing questionnaires to pre-service teachers who are selected as subjects, data reduction, data analysis, and conclusions.

III. RESULTS AND DISCUSSION

The study was conducted on 97 pre-service teachers. PCK indicators measured included insight and educational foundation, learners, curriculum and syllabus, lesson planning, learning implementation, technology in learning, learning outcomes evaluation, and students' development to actualize their potential. Based on PCK data analysis results obtained from 97 pre-service teachers that understanding PCK is classified into three categories, namely high, medium and low are presented in Table I.

Table 1. Distribution Of PCK Understanding

No	Score	F	Relative Frequency (%)	Cumulative Frequency (%)	Note
1	$X > 169$	2	2,06	2,06	High
2	$107 \leq X \leq 169$	95	97,94	97,94	Medium
3	$X < 107$	0	0	100	Low
Total		97	100		

Table I illustrates that pre-service teachers' PCK comprehension is 97.94% in the medium category, very few students are in the high category, and no one is categorized low. Thus in general understanding of pre-service teachers toward PCK is in the category of being. Furthermore, the average PCK of pre-service teachers on each indicator at each level is presented in Table II:

Table 2. The Average Achievement of Pre-Service Teachers' Understanding in PCK

GPA	A	B	C	D	E	F	G	H
High	3,21	3,11	3,26	3,23	3,21	3,08	3,17	3,06
Medium	3,13	3,12	3,20	3,20	3,26	3,12	3,10	3,05
Low	3,13	2,99	2,96	3,14	3,24	3,13	3,03	2,89

- A: Understanding of the Insights and the Educational Foundation
- B: Understanding of the Learners
- C: Understanding of Curriculum Development
- D: Understanding of Lesson Planning
- E: Understanding of Educational and Dialogic Learning Implementation
- F: Understanding of Technology in Learning
- G: Understanding of Learning Outcomes Evaluation
- H: Understanding of Development to Actualize Their Potentials

The pre-service teachers' understanding of PCK on each indicator is qualified, although at the lower level, the average is below three in the indicators of understanding of the students, curriculum development and syllabus, and the students' development to actualize their various potentials. In general, for students who have a high category GPA and are understanding PCK indicator which is indicated by the average level of the understanding score above 3.00. As for students who have a low GPA achievement, not all PCK indicators can be understood that is to indicator understanding of learners with an average level of understanding 2.99; development of curriculum or syllabus with the level of understanding 2.96; the development

of learners to actualize the various potentials possessed by the level of understanding 2.89. The grade point average of pre-service teachers is categorized into 3 categories: high, medium, and low. This GPA is the acquisition of cumulative value of students who have been obtained from the 1st to the 8th semester. The categories of trends can be seen in Table 3:

Table 3 Distribution of GPA Achievement

No	Score	F	Relative Frequency (%)	Cumulative Frequency (%)	Note
1	$X > 3,38$	37	38,14	38,14	High
2	$2,94 \leq X \leq 3,38$	48	49,48	87,62	Medium
3	$X < 2,94$	12	12,37	100	Low
Total		97	100		

Based on Table III, the achievement of GPA of pre-service teachers tends to have a normal distribution, there are 37 people (38,14%) have a high GPA, 48 people (49,48%) have medium GPA, and 12 people (12,37%) have a low GPA. Based on the above description, the following is a diagram of the relationship between the achievement of the GPA with the pre-service teachers' PCK understanding:

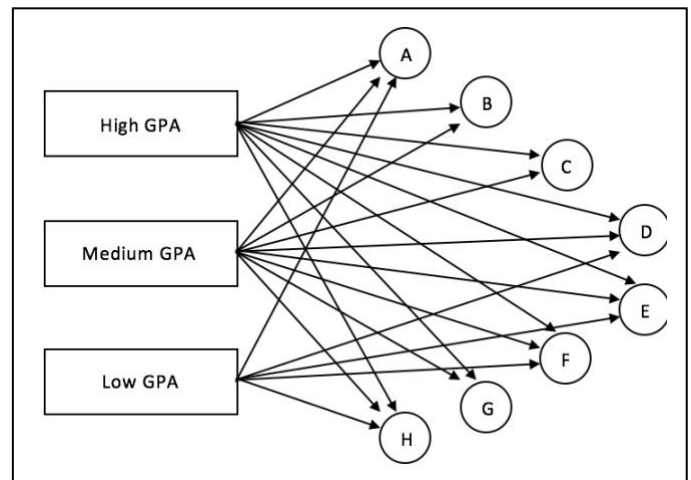


Figure 2. Relationship Between GPA Achievement And PCK Understanding

In general, pre-service teachers, who have high and medium GPA achievement, they understand PCK as a competency that must be possessed by teachers. However, for students in low GPA achievement, they do not understand PCK comprehensively, whereas this PCK is a competency that must be understood by pre-service teachers and who have become teachers.

IV. CONCLUSIONS

The study conclude that the pre-service teachers' PCK understanding as much as 2 people (2.06%) in the high category, and 95 people (97.94%) in the medium category. There is no one in the low category. The high GPA of pre-service teachers as many as 37 people (38.14%), the medium GPA as many as 48 people (49.48%), and the low GPA as many as 12 people

(12.37%). The pre-service teachers who are in high GPA and have high PCKs' understanding on each indicator are: insight and educational foundation, learners, curriculum and syllabus, lesson planning, learning implementation, use of learning technology, evaluation of learning outcomes, and students' development to actualize their various potentials. While pre-service teachers who have low GPA not understand PCK thoroughly on each indicator. Some indicators that have not been understood are learners, curriculum and syllabus, and evaluation of learning outcomes. Some pre-service teachers have high GPA but their PCK understanding is moderate, others have low GPA but the high understanding of PCK. In general, the level of understanding of student PCK pre-service teachers is moderate. Most of the pre-service teachers who have achievement of high and moderate grade point average have understanding on PCK whereas students who have low-GPA do not comprehend PCK comprehensively, that is in learning process, student of teacher candidate already have competence in preparation, execution of teaching, which can be identified as knowledge of the content, pedagogic content, curriculum, general pedagogic, purpose, and educational context.

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