

MEASURING PRESERVICE PEDAGOGICAL CONTENT KNOWLEDGE IN CONSECUTIVE PROGRAM

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ABSTRACT

A study to measure Pedagogical Content Knowledge (PCK) of prospective biology teachers who joint the Professional Teacher Education Program (PPG) through consecutive approach was carried out with the involvement of prospective teachers who have completed their study in Biology. The longitudinal study was conducted for one whole academic year. Data was collected using CoRes and Pap-eRs tests, interview techniques, observation and analysis of teaching skills curriculum documents, lesson plans they made, and field notes. Research data obtained through the CoRes and Pap-eRs on topic "the transport of substance", after the program run for 12 month was analyzed by descriptive techniques using qualitative and quantitative concurrent triangulation design. Preliminary results indicate that prospective student teachers' PCK on biology is very limited. Research finding shows their improvement since the first test conducted at the beginning of the program to the second test conducted after the pedagogical workshop, then the third test after peer teaching and the last test after teaching practice at school. The results suggest that training and experience improve preservice teachers' PCK.

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1. INTRODUCTION

Teacher is a profession, which means a job that requires special skills as a teacher and can not be done by any person outside the field of education. Professional work is supported by a particular in-depth knowledge that only may be obtained from educational institutions as appropriate, so that performance is based on science that can be justified scientifically. For that a professional teacher should be prepared from the beginning, when they were still a student teachers. Prospective teacher should be able to plan and incorporate science teaching strategies appropriate for students with diverse backgrounds and learning styles (NSTA, 1998).

One program that will print a professional teacher education program is organized S1 at various LPTK in Indonesia, in this educational program students will be procured science pedagogy (pedagogical knowledge) and teaching material (Content knowledge) are balanced. Science pedagogy and subject matter is given continuously for four semesters which will then proceed to the practice of collaborative teaching that takes place within the professional community.

Students' ability in integrating pedagogy and content is one of the skills that will illustrate their ability of pedagogical content knowledge. PCK is the knowledge that is important in the process of developing science literacy and teachers' ability to transform knowledge into the learning process. Teacher Education program design that refers to content-based and content-specific pedagogy and have long stated by Shulman (1987), that a professional teacher should have the knowledge and ability of Pedagogical Content Knowledge (PCK) is good. As the agent of change should continue to develop the teachers teaching in the classroom and continue to train prospective teachers in designing learning ability, one of them with understanding the PCK. Pedagogical Content Knowledge is knowledge that should be understood by a teacher and prospective teacher because a teacher must be familiar with the concept alternatives and the difficulties that would be faced by a diverse student backgrounds and allows you to organize, prepare, execute and assess subject matter, all of which are summarized in the PCK (Shulman, 1986).

PCK is the knowledge, experience and expertise gained through experiences in the classroom (Baxter & Lederman, 1999; National Research Council, 1996; Van Driel et al., 2001). PCK is a collection of integrated knowledge, concepts, beliefs and values developed by the teacher in teaching situations (Marks, 1990; Fernandez - Balboa & Stiehl, 1995; Van Driel, Verloop, & de Vos, 1998; GESS - Newsome, 1999; Loughran, Milroy, Berry, Gunstone, & Mulhall, 2001; Loughran, Erry & Mulhall, 2004 in Lee and Julie, 2008). The National Science Education Standards (National Research Council, 1996) stated: "Incorporated the concept of PCK as an essential component of professional development for science teachers". "A teacher's Understanding of how to help students understand specific subject matter" (Magnusson, Krajcik, & Borko, 1999). Shulman's (1986, 1987) suggestion that teachers needed strong PCK to be the best possible teachers has resulted in a range of studies into PCK in pre-service science teacher education.

According to Shulman (1987) PCK is the knowledge which is important and must be owned by a teacher. Results of several studies suggested that PCK is the knowledge that is very important and must be owned by a teacher. Through programs that meet the needs of a professional teacher then designed a program of professional education of teachers through consecutive approach, whose goal is to integrate knowledge and teaching materials pedagogical knowledge (Kartadinata, 2010). There is a suggestion that students who take the program consecutive approach, minimal pedagogic skills. Based on some of these reasons, it is necessary to conduct research on the development of the ability of prospective teachers PCK consecutive program.

2. METHOD

The study was conducted in Indonesia University of Education in Bandung, with the involvement of student teachers who are following the program consecutively as a research subject. The sample was selected using random sampling techniques.

Research Design and Procedure

This study includes a non-experimental Research. This development is done by using a longitudinal study.

a. analyzing the Curriculum

The study begins by tracing the documents include curriculum PPG program.

b. Analyzed the ability of Pedagogical Content Knowledge

Participants were asked to make CoRes and PaP-eRs to transport substances across membranes topic, the aims to see their PCK abilities after completing the course. When participants are not allowed to work in collaboration and not be open book. A few days after the execution, carried out interviews with participants, associated with coRes and PaP-eRs that they make. The data were analyzed using descriptive qualitative and quantitative techniques using concurrent triangulation design (Creswell, 2007). The process of data collection and data analysis conducted continuously through the process of "checks and recek", analysis and re-analysis, so the overall development of the results obtained.

4. RESULT AND DISCUSSION

a. Professional Education Teachers Program Curriculum

Students who have completed the program S-1 basic science teachers' continuing professional education program for three semesters or 18 months. The first semester debriefing sciences pedagogy (matriculation) followed by a workshop making syllabi and lesson plans, peer teaching for one month followed by a presentation of the design and PTK for two weeks. In the third semester students will go to school to teaching peractice (PPL).

Matriculation

The goal of matriculation is to provide education provision relating to the development of teaching materials, an understanding of learners, mastery of learners, mastery learning to educate, and the development of personality and professionalism. Debriefing through matriculation program graduates are expected to have sufficient knowledge to plan, implement, and assess learning outcomes and follow-up assessment, the guidance and training of learners and how to conduct research and how to develop continuous professionalism.

Tabel I. Matriculation Courses

No	Course	Credits
1.	Curriculum Analysis	2
2.	Biology Teaching and Learning	4
3.	Research Methodology	2
4.	Evaluation of Learning Biology	2
5.	Capita Selecta Biology	4
6.	Learning Biology Media	2
7.	Biology Lesson Planning	2
8.	Students developments	2
Total		20

Implementation

Model of PPG

Block system, the first semester do the workshop of Subject Specific Pedagogy (SSP) and PPL implemented in the second semester.

Workshop stages

Plenary I

1. For new participants begins with a general explanation PPG program, followed by a discussion and question and answer.
2. Group discussions guided by the supervisor (DP), lecturer, teacher and tutor (GP), discussions held to discuss;
 - a. The selection of themes / learning materials
 - b. Synchronization theme / material with SK and KD
 - c. Consolidation of material for the field of study (if necessary) and lecturers facilitated Supervisor subjects
 - d. Choice of approaches / methods / learning strategies.
3. Group work / RPP independently develop tools
 - a. Expands indicators and learning objectives
 - b. Designing learning evaluation
 - c. Designing instructional materials; students choose books, worksheets, learning Media
 - d. Designing learning scenarios / RPP
4. Presentasi Syllabus and RPP for some subjects

Plenary 2

1. Presentation of the group / self, a peerteaching
2. Input from teachers and peer tutors
3. revised Draft
4. RPP approval by the DP and GP
5. Peerteaching
6. Reflection and revision, produce RPP ready for PPL

The Ability of PCK (Value of Content and Pedagogy)

Table 2. The average value of the concept / idea, Content representation and Pedagogy

No	Code	Value											
		Ide/Konsep				CoReS				PaP-eRa			
		Tes I	Tes II	Tes III	Tes IV	Tes I	Tes II	Tes III	Tes IV	Tes I	Tes II	Tes III	Tes IV
1	A	6	5	5	6	20	85	103	129	2	8	10	18
2	B	7	7	6	6	18	89	150	167	2	8	12	18
3	C	7	7	7	6	14	64	118	131	0	6	8	15
4	D	7	3	3	6	30	50	64	147	0	4	9	18
5	E	7	8	7	7	29	60	159	173	2	6	12	18
6	F	3	5	7	6	37	61	109	120	1	6	8	12

No	Code	Value											
		Ide/Konsep				CoRea				PaP-eRa			
		Tes I	Tes II	Tes III	Tes IV	Tes I	Tes II	Tes III	Tes IV	Tes I	Tes II	Tes III	Tes IV
7	G	11	6	8	7	25	10	79	125	0	0	2	15
8	H	6	3	4	7	34	38	90	134	1	8	8	15
9	I	9	9	7	7	14	55	104	122	2	6	9	18
10	J	2	7	3	5	11	33	43	65	0	2	6	8
Average		4	5	5	7	23	55	102	131	1	5	8	15

CoRe :

0 - 56 = Least
 56 - 112 = Less
 112 - 168 = Good
 168 - 224 = Very Good

PaP-eRs :

0 - 4 = Least
 4 - 8 = Less
 8 - 16 = Good
 16 - 24 = Very Good

In table 2, there is a decrease in the number of emerging concepts, while the value of content and pedagogy increased. Number of concepts of diminishing showed that prospective teachers have been able to categorize concepts into its structure and have been able to determine which concepts are attributes. Sub concept as an attribute of another concept that no longer appear on all four tests, such as the concept of hypertonic, hypotonic and isotonic which are attributes of the concept of osmosis. An increasing the value of content in the cores showed that the ability of prospective teachers in outlining important concepts related to curriculum, state students, and evaluation facilities is getting better. The average of the fourth test obtained 131, which means it has in a good range.

The increasing value of content is proportional to the increase in the value of pedagogy. Pedagogical value also showed a good improvement on each test performed, the test to IV obtained an average of 15 which means good. Good Improvement occurred on fourth test, after prospective teachers doing teaching practice in schools. Actual situation in the field certainly gives a real experience, so that prospective teachers can determine the appropriate methods and models. Such as role playing models used by some prospective teachers in planning to teach the concept of passive transport, diffusion and osmosis, it is less precise model of the field, can not run properly.

Model of role playing requires more time and every child should be given a proper understanding of the role before role playing performed. In addition role playing model less suitable for passive transport concept, because the concept is abstract and related to students' daily lives while in role playing model not every students will have a role, meaning that not all students have the opportunity to understand the concept, more appropriate if each student do direct observation. This pedagogical value shows how the ability of prospective teachers in determining the appropriate method of teaching every important concept that emerged related to the material characteristics and the characteristics of their students. Results of Cores and PaP-ers showed that the ability of a specific subject and the teacher pedagogy after following matriculation, workshops, peer teaching and practical teaching in schools are better. In line with the statement of Shulman (1987) that when a teacher planning lessons, teach, adapt to the needs of students and reflect mean they have developed their PCK.

4. CONCLUSION

Based on the research that has been done, it can be drawn a conclusion that the ability of content/subject specific pedagogy and biology teacher candidates who join the consecutive program have increased. Research finding shows their improvement since the first test conducted at the begining of the program to the second test conducted after the pedagogical workshop, then the third test after peer teaching and the last test after teaching practice at school. The results suggest that training and experience improve preservice teachers' PCK.

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