

# Content Representation on Earth and Space Topic by Experienced and Prospective Primary Teachers

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**Abstract**— Content representation is an important part of a teacher's ability to prepare lesson as its represent teachers Pedagogical Content Knowledge. Pedagogical Content Knowledge represents the blending of content and pedagogy into an understanding of how particular aspects of the subject matter are organized, adapted, and represented for instruction. The better of pedagogical content knowledge they create the more effective lesson in the classroom. This paper aims to compare the ability of experienced teachers who continuum they study in program S1 and prospective primary teachers. Data collected from a document prepared by each sample and interview on the content representation. After processing the data found there are the different ability and variation ability between two groups in all aspect.

**Keywords**— *Representation of content; experienced primary teacher; prospective primary teacher; earth space*

## I. INTRODUCTION

According to the regulations, the Government of Indonesia Number 19 the Year 2005 on National Education Standards, Graduate Education is a primary school teacher education to be achieved by an elementary school teacher. So that the required equalization of the levels of some teachers who still have levels below it. Currently, quantitatively teacher population in Indonesia is very large. Nationally, there are many teachers who do not meet the requirements of academic qualifications. The data of 2008 the number of teachers who have not qualified S-1 / DIV many as 1.656.548. To expedite all teachers meet the requirements of the educational qualifications which will be completed in 2015 in accordance with the mandate of Act Number 19 the Year 2005, the government through the Ministry of Education since 2006 to subsidize the improvement of qualification of teachers in the educational unit of primary and secondary current and future education S1/D-IV, both teachers not PNS or PNS [1]. As in the Universitas Terbuka and some universities to get permission for administering the program. Accordingly, the implementation of teacher certification, which began in 2007 will continue to be

done, so expect the teachers there and have met the requirements to obtain a certificate in accordance with the criteria and timescales set out in the Act.

The Government of Indonesia through the Ministry of National Education is trying to revitalize the performance of teachers one way to tighten the requirements for anyone who wants to pursue a professional career in the field of education. With the minimum qualification requirements as stipulated in Law Number 14 the Year 2005, the expected teacher actually has the competence as a learning agent. In Government Regulation Number 19 the Year 2005 states that a person who does not have a diploma S1, D-IV, or a professional certificate, but have special expertise that is recognized and required to be appointed as a teacher at the kindergarten/RA up to high school or some other form of equal, after passing the test feasibility and equality with certain signs it is certainly going to open up opportunities for interested parties to devote himself as an educator. However we need to ensure is the competence of a learning agent includes pedagogical competence, personal competence, professional competence and social competence, must be present in any prospective educators at any level. Of course, while giving priority to the regular education.

In this paper will be presented phenomena on pedagogic competence and professional competence represented by PCK (Pedagogical content knowledge) between classes regular classes run by the college teacher with a bachelor's equalization program teacher, to see how big the difference between the two groups. PCK is a blending of understanding of a teacher in a learning process with the material taught in class. This capability will be drawn through the data content representation consists of (1) selecting essential content to be taught in the classroom, (2) the runway election content development, and (3) The depth of the content that is taught to students (4) predicting learning difficulties (5) determination conditions of the students into consideration in teaching the concept of (6) to consider the factor of pedagogical else to teach content (7) the election sequence / groove to teach

content (8) choose the way of assessment of comprehension of content. (9) the use of technology in learning [2] [3] [4]. Content representation consisting of two broad categories of information related to curricular and instructional decisions Hollon et al., in [5].

## II. METHODS

In this paper, it is shown the ability of prospective teachers and experienced primary schoolteachers who follow the equalization program combines education undergraduate their understanding of the content of the earth and the universe with pedagogy to teach students in grade 2 and 3. Data collected from a document prepared by the teacher in the form of document content representation complemented by interviews to deepen the foundation for preparing content. Prospective teachers involved in this study is a prospective teacher who has followed the PPL as many as four people (group A) and experienced teacher who follows the undergraduate level equalization program as much as four people (group B).

## III. RESULTS AND DISCUSSIONS

A good teacher teaches Content on students refer to concepts that are considered important by teachers so that students can develop their own understanding based on the structure of learning materials as well as the factor of pedagogical such as the level of student understanding, structural thinking students as well as aspects of the development of other students and not with the purpose of the number of ideas taught. Nevertheless, a large number of ideas were too little to indicate that too many concepts that are covered in a great idea. While the big idea that too much to indicate that the topic is split into chunks of information that are not related. Hence, the development of big ideas can take a long time and require deep thought [2] [3] [4].

PCK display prospective teachers learning is influenced by the constructive perspective, the implications for classroom teaching for the prospective teachers to develop knowledge of the content and learners to make (1) curricular decisions; and, (2) instructional decisions by Hollon et al., in [5]. Referring to the components of Content Representation, the ability of teachers, divided into two groups, namely the use of knowledge about science and learners as a basis for making decision-curricular (1, 2, and 3) and the use of knowledge about science and learners as a basis for decision making teaching / instructional (4, 5, 6, 7, 8, and 9) [2] [3] [4]. In this study, will be outlined as follows.

There are three important things that make a prospective teacher has the maturity in decision making related to the content, or about what will be taught to students: (1) choose the essential content to be taught in the classroom, (2) the runway choosing the content, and (3) the depth of the content that is taught to students by Hollon et al., in [5]. These three things make the teacher has the accuracy in selecting and establish something that will be taught to students. A content will be taught to elementary school students is very different with the same content that is taught at a higher level, of course, prospective teachers must have the ability to sort the material

being taught to be right on the needs/accordance with the basic competencies required.

In the aspect of selecting/determining the essential content, from the processing of the interview, there are several different considerations to be considered by teachers when selecting the essential concepts, among others,

TABLE I. CHOOSING / DETERMINING THE ESSENTIAL CONTENT.

Group A	Reasoning	Group B
	reason to support students in an attempt to capture and develop knowledge in the area of the concept as a whole/part of the stages of concept mastery comprehensively	
A2, A3	Reason to support students in an attempt to capture and develop knowledge in the area of concept in accordance with the demands of the curriculum.	B1, B2,B4
A1, A4	Reason to support students in an attempt to capture and develop knowledge in the area of the concept according to the curriculum, although the concept is written by prospective teachers still are global.	B3

Experienced teachers always consider the stages of acquisition of knowledge as a foundation for students choosing the content and scope of the competence of science to students. Do not let the material being taught too wide to things that are not important to the development of student's conceptions or misconceptions so that there should not be too shallow material submitted that hinder the development of science students, both should be considered in the selection of learning content. Past research has indicated that an experienced teacher who has little problem in determining what should be learned, learners. Instead of inexperienced teachers tend to be unsure about what should be achieved learners [2] [6].

Next on the content development aspects of the election anvil, if the note that both groups A, and B have a reason to choose a concept within the range that is almost the same. This means that the ability of group A, in selecting contains more based on the grounds that more likely right. There are three main runway is the reason for choosing the content that prospective teachers

TABLE II. THE SELECTION OF CONTENT DEVELOPMENT.

Group A	Reasoning	Group B
A3	Relating to the content structure and phases of achieving the concept of students, the interests of the content to students and its relation to pedagogy as motivation to learn.	B1,
A2,	Relating to the content structure and phases of student achievement concept and content of the student's interests	B2,B4
A1, A4	Relating to the content structure and phases of student achievement concept	B3

In the development of this concept is an important reason to be known by the students can be seen in the graph below. At first prospective teachers group B can be argued that better-related foundation concept selection. On average prospective teachers group B raises the overall value of the importance of concepts related to the content structure and phases of student achievement concept and content of the students' interests.

Reasons for selecting the right learning content is just one indication of the ability of prospective teachers leads to the ability of a professional teacher. Teacher professional to determine this based on the experience and knowledge they are also related to the daily lives of learners so that they can create meaningful learning and motivating the students to understand the concept. Often the reasons for the importance of students to learn concepts relating to other curriculum objectives [2] [6]. In general, good teacher candidates in group A and group B in the end have a tendency directed learning in the didactic purpose that promotes learning goals the reason for selection of content. Even though there is still much more ideal destinations such as the purpose of the process, conceptual change, activity, etc. [7].

Furthermore, in the aspect of content restriction's reasons that should be taught to students from the interview, there are several reasons used as the basis for limiting the prospective teachers are learning content.

TABLE III. TABLE 3 . RESTRICTIONS ON CONTENT TO BE TAUGHT.

Group A	Reasoning	Group B
	Taking into account the structure of the content and the ability of students, aspects which are important aspects that appear potentially obscure the understanding of the concept as a whole.	B1, B2
A2,	Based on the structures of such content.	B4
A1, A3, A4	Related concepts raised important but the concepts become very simple.	B3

Reasons for selecting this limitation also encapsulates a message of insight prospective teachers to the learning material that is taught, if looked over in that prospective teachers or teachers who are able to give clear boundaries with the reason they have extensive knowledge about the materials. This indicates that the two groups have almost no difference in terms of the reason for choosing the content restrictions. This condition is seen from the results of interviews among others committed to A3 that reason concerned in selecting the limits of the concept "primarily concerned with the structure of the curriculum in grade 4 (next grade), the structure or the depth of the material being taught and the most important is the material more clearly understood by students ". Prospective teachers or teachers often make difficult decisions to sort out the material that will be included and which are not, so that learners can begin to develop an understanding of a topic [2] [6]. Despite that good science teachers can recognize not oversimplify the material or retain complexity to improve understanding of the learners, they also balance this with the knowledge that is considered difficult for learners.

The action plans appropriate instructional class with an understanding of diversity is certainly not an easy thing for a novice teacher. Hollon et al., in [5] there are at least five things that support instructional decisions taken by a teacher: (1) predicting learning difficulties (2) the determination of the students into consideration in teaching the concept of (3) to consider factors other pedagogical teaching content (4) the election sequence/groove to teach the content (5) choose the way of understanding the content ratings. Additionally, (6) the use of technology in learning helped contribute to instructional decisions selected by a prospective teacher [3] [8] [9] [10].

From the core component is measured, it can be described as follows

First, the reason predicts difficulties in teaching prospective teachers found several reasons that underlie them to predict the difficulties of teaching and use it as an effort to teach science effectively, among others:

TABLE IV. PREDICTS DIFFICULTIES IN TEACHING.

Group A	Reasoning	Group B
	Associated with a particular concept as part of this concept, the limitations of the models and analogies, for producing an understanding and explaining the phenomenon, information in response to changing teaching concepts construct concepts related constructive stages.	B2 B3
A2,	Associated with a particular concept as part of this concept, the limitations of the models and analogies, for producing an understanding and explaining the phenomenon.	B4 B1,
A1, A3, A4	Practical reason / general accordance with the concept.	

Experienced teachers use knowledge and information to shape the way they teach concepts and specific topics in the classroom. Without this feature PCK it could also be said that the teaching was not sighted constructive because it is not concerned with the treatment of students, arrangement, synthesize and reconstruct their knowledge, but it looks like adding a piece of new knowledge in the knowledge that already exists [2] [3]. Ref. [8] assume that teachers have insight into the potential reading difficulties when teaching a particular topic for the class is the best teacher of the pedagogical content knowledge. If this applies to teacher candidates the prospective teacher like this deserves to be called by prospective teachers who are ready to teach.

Second, the reason for the determination of the students into consideration in teaching can be seen in the following table, it appears that there is an average increase of more increase from both groups, although both have increase, but the potential group B is superior to the average in this group average has a foundation in determining the conditions of the students on the ability of prospective teachers write about the condition of students related aspects affecting, the general concept is understood by students (including the level of interest/concern) previous understanding, the learning situation specific in how to respond to the difficulties in studying them or make alternative teaching stages.

TABLE V. THE DETERMINATION OF THE STUDENTS INTO CONSIDERATION IN TEACHING.

Group A	Reasoning	Group B
	Related conditions of the students, the general concept is understood by students (including the level of interest/concern) prior understandings, specific learning situation systematically.	B2 B3 B4
	Related conditions related students, the general concept is understood by students (including the level of interest/concern) prior understandings, specific learning situation.	B1,
A1, 2, A3,A4	Related conditions of the students in general/practical and content	

Thirdly, the reason for selecting another pedagogical factor as consideration for teaching. This aspect is aimed at teachers of contextual knowledge about the learners and the general PCK its ability to explore the impact on teaching construction. A tendency to choose practical reasons indicate that this aspect began to evolve into a better direction although it is expected the reasons raised should be reasons related to pedagogy, contextual knowledge about students and pedagogical knowledge commonly affecting the teaching approach is indicated at the core [2] [6].

TABLE VI. CHOOSING PEDAGOGICAL FACTOR AS CONSIDERATION FOR TEACHING.

Group A	Reasoning	Group B
	Practical reasons but also pedagogical and content such as the situation of the students, the state of content, targeted competencies and lessons learned from the experience of teachers.	B1,B2 B3 B4
A2, A3,	Related practical and pragmatic reasons and also the structure of the curriculum and competencies that influence the way of teaching.	
A1, A4	Not related even if only for practical reasons that do not lead to the selection of teaching methods	

Fourth, the reason for choosing the teaching procedure. Prospective teachers have not been able to determine the exact reason in making a decision in determining the flow of teaching not only of practical reasons but rather on the reason that is functional as a response to the development of students' knowledge, time and other pedagogical factors. In general, the habit of prospective teachers choose the teaching procedures is an important aspect of PCK for its expertise in selecting teaching procedures in accordance with the intended learning outcomes and know not only how to use it, why, on what basis is a procedure used to meet the needs of contextual teaching. Surely this can be an indication of the expertise of a professional teacher. Although teaching procedures alone cannot guarantee to learn, but information and decisions in the use of the procedure can affect students thoughts and also can promote a better understanding of the ideas of science [2] [6].

TABLE VII. CHOOSE THE TEACHING PROCEDURE.

Group A	Reasoning	Group B
A1, A4	Considers respond to developments in the classroom, the time available and the situation that occurred in the classroom as well as the needs of students as stage mastery of concepts and other pedagogical aspects.	
A2, A3,	Based on the structure of the content and experience as a teacher in teaching the concept stage of mastery.	B1, B4
	Consider the textbook and the teacher taught the concept of previous experience as a stage of mastery of concepts	B2 B3

Teaching is very important in distinguishing between different aspects of the teaching plan for and teach a teaching material. Ref. [2] distinguish between learning activities,

procedures, and strategies. Knowledge of a variety of teaching procedures is an important aspect in the PCK since the ability to choose the teaching procedures in accordance with the desired learning outcomes and adapt to the available time is a good indication of expertise that can further enhance the understanding of learners. According to [11], using the strategies taught correctly is important to ensure students conceptual understanding. Various activities performed in class can also have a positive effect on understanding the challenges associated with the knowledge gained by the students [12] [13]

Fifth, the reason for choosing how student to understanding of content, group A seemed more advantages for prospective teachers in group B more aspect of this is used to dig up information on how to approach the teaching of teachers can use to determine the effectiveness of learning as well as adjusting they are thinking about the situation the same or similar in the future. This aspect leads to a continuous activity and the improvement of students' concept is not only the orientation of the administration.

TABLE VIII. CHOOSE HOW TO EVALUATE THE CONTENT.

Group A	Reasoning	Group B
A1, A3, A4	Consider the understanding and development of the conception of students with a comprehensive and systematic manner considering assessment strategies varied and more creative in accordance with the concept given.	
A2,	Taking into account the development of students' conceptions of understanding and using tests that vary in accordance with the concept raised.	B1, B4
	Taking into consideration the interests of administrative	B2 B3

There are three things on which to base the selection of the assessment, the first assessment aimed to see the development of student's knowledge is good when already mastered the knowledge and mastery of the concept stage. Second, to find out if the material being taught is appropriate for students or not. Third, in an effort to determine the method used was appropriate or not.

Lastly, the reason for the use of technology in learning. In the aspect of the use of technology in learning the reasons, it appears that prospective teachers of group A were able to explore better. Seemingly the considerable differences between the two groups.

TABLE IX. THE USE OF TECHNOLOGY IN LEARNING.

Group A	Reasoning	Group B
A3, A4	In accordance with the characteristics of the material leads to the formation of the pattern of thought and scientific work as well as the motivation of students.	
A1, A2,	In accordance with the characteristics of the material.	B1, B3, B4
	Taking into consideration the student's motivation	B2

In this study appear prospective teachers to maximize the function of technology as a tool for learning, but they are not interactive. Just as B4 use video as a tool to teach the lesson for prospective teachers use learning model two stay two strays. The video is used as a source of study and learning aids in understanding. Basically, the use of technology in learning had a big hand in learning both as a tool (tools), in this case the typewriter used as a tool for the user (user) or students to help learning, for example in word processing, work with numbers, create graphic elements, making database, create an administrative program for students, teachers and staff, personal data, the financial and so forth, or as science (science). In this regard the technology as part of the disciplines that must be mastered by the student. Technology and materials and serves as a tool for learning (literacy). In this case, the technology is defined as learning materials as well as tools for computer-aided control of a competency. In this case, the computer has been programmed such that students are guided gradually by using the principle of complete learning to master competencies. In this case, no different position as a technology teacher who serves as a facilitator, motivator, a transmitter, and evaluators

Likewise, prospective teachers who master the technology in learning will tend to have the freedom to determine the best learning. Especially on the students. The impact of learning that use technology includes a positive impact on the students, one of which is growing motivation to learn [14] one of the reasons is because the prospective teacher can present a more attractive learning for students. The final impact of the series of these capabilities is the growing confidence of prospective teachers while teaching in the classroom. Teachers who master the technology in learning have a better self-efficacy [9][10]

#### IV. CONCLUSION

- Increased Pedagogical Content Knowledge prospective teachers and teachers who study S1 will increase self-efficacy so these needs to be a pressure point for the education of primary school teachers.
- The difference between the two groups, group A (prospective Teachers) superior on the theoretical side and the group B (experienced teachers) is superior to the experience.
- So as to improve the two groups in order to have sufficient capacity necessary to multiply the group B (prospective

Teachers) and group A (experienced teachers) practice requires academic study.

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