

Pedagogical cognitive knowledge in an effort to improve students' cognitive abilities: Systematic literature review



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ABSTRACT

This researcher aims to improve pedagogical cognitive knowledge ineffectiveness to improve students' cognitive abilities. This research method is the SLR (Systematic Literature Review) method. So that the selected literature is relevant search using the keywords "PCK, Cognitive Ability, and SMP. Furthermore, screening is carried out to get scientific article publications since 2017-2022 which discusses pedagogical content knowledge improve cognitive abilities. The results showed that there were 13 articles worth analyzing. The results showed that Pedagogical Cognitive Knowledge has an effect on increasing students' cognitive abilities.

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1. Introduction

Content knowledge of cognitive abilities is an assessment criterion in the education system in Indonesia. The importance of the scientific process to the cognitive ability of each individual has the ability to find facts, understand concepts, and devise procedures that ultimately all domains are contained in the daily life of learners. The ability of Indonesian students to do high-level thinking and advanced (reasoning) questions is only 5%. This is very low when compared to Korean students at that time already 71% of them could do the same questions. When viewed from another point of view, 78% of Indonesian students only get low-level questions (knowing), while Korean students only 10%. In 2009, the results of the PISA survey also reported the low ability of Indonesian students in mastering the subject matter. Almost all Indonesian students only master lessons up to level 3, when compared to other countries, many have reached level 4 to level 6 (Solihat, 2019). Pedagogical Content Knowledge (PCK) is described as the result of combining material knowledge (content knowledge) and learning knowledge (pedagogical knowledge) in one whole package of a teacher. Shuell and Shulman (Eggen & Kauchak, 2010) state that PCK as knowledge of effective learning methods for describing the material, as well as knowledge that makes the material feel easy or difficult to learn. PCK is a special knowledge that exists in teachers in terms of mastery and how to teach the content of the material to students with strategies that are able to direct towards understanding (Ima Duddin, 2014). To be able to carry out learning well, teachers must master several categories of knowledge domains, one of which is PCK. The ability of PCK in this case is knowledge of teaching for specific content (Agustina, 2015).

This cognitive ability can be trained through the provision of materials or subject matter so that students can solve problems, both in the classroom and in everyday life. Pedagogical Content Knowledge (PCK) was introduced by Shulman in 1986. According to Shulman (1986) there are three professional knowledge that are important for a teacher are Subject Matter Content Knowledge, Pedagogical Content Knowledge and (Curricular Knowledge). PCK is a combination of two types of competencies, namely pedagogical competence and content knowledge. Pedagogical Content Knowledge (PCK). is one of the important knowledge and elements that must be mastered by a

teacher in improving the quality of teachers (Hanggara, 2015). According to susanto cognitive is a process of thinking, that is, the ability of individuals to connect, assess, and consider an event or events (Ahmad Susanto, 2011). Correspondingly, yusuf also argues that cognitive ability is the ability of children to think more complexly and do reasoning and problem solving, the development of This cognitive ability will make it easier for children to master broader general knowledge, so that they can function reasonably in people's daily lives. (LN, 2016). Based on these problems, researchers are interested in developing "Pedagogical Cognitive Knowledge in an Effort to Improve Students' Cognitive Abilities".

2. Method

This research is a systematic review (Snynder, 2019) using the Preferred Reporting Items for Systematic Reviews and Metaanalyses method or commonly called PRISMA (Page & Moher, 2017). Systematic literature review is a method used to, evaluate, determine and interpret all the findings of research problems in answering predetermined questions. With the use of this SLR method, researchers can systematically review and identify journals which in each process follow the steps or protocols that have been set (Triandini et al., 2019). The inclusion criteria used are articles for 2017-2022, research topics include science. The exclusion criteria are that research articles cannot be accessed in full, fulltext that cannot be accessed. The literature stage is based on using Research Questions so that the discussion is more focused and more focused on researchers looking for related data. The Research Question (RQ) in this study is presented in Table 1.

Table 1. Research Question

Research Question	Motivation
What is pedagogical cognitive knowledge in an effort to improve the cognitive abilities of junior high school students.	Identification of pedagogical cognitive knowledge in an effort to improve the cognitive abilities of junior high school students.
How effective is the use of pedagogical cognitive knowledge in an effort to improve the cognitive abilities of junior high school students.	Identify the effectiveness of the use of pedagogical cognitive knowledge in an effort to improve the cognitive abilities of junior high school students.

The articles used in this literature review are articles obtained using Google Scholar and Scopus. The search for research literature relevant to this research topic was carried out with the keywords: "pck, cognitive ability, SMP". The literature search was carried out from September-October 2021. Then the articles are selected according to the research topic so that 13 research articles are collected that are considered to be representative of the entire research article on improving cognitive abilities junior high school students. The articles used are 13 articles published in the last 5 years. In the selection of articles used in writing literature, inclusion and exclusion criteria are needed to select the main researcher. The results of searching for data with this criterion are what the author will use to review articles. The inclusion and exclusion criteria in this literature are seen in Table 2 below.

Table 2. Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
<p>Research articles published in 2017-2021.</p> <p>Research topics include science learning</p> <p>The subject of study is limited to elementary school, junior high school,</p> <p>The method of research articles is in the form of experiments and development. Especially in the article of development, the researcher only selects articles that conduct research up to the field trial stage.</p>	<p>Research articles that cannot be accessed in full</p> <p>Literature does not correspond to the discussion.</p>

After determining the inclusion and exclusion criteria, then the selection of articles to be reviewed. Here's a chart of the article selection process.

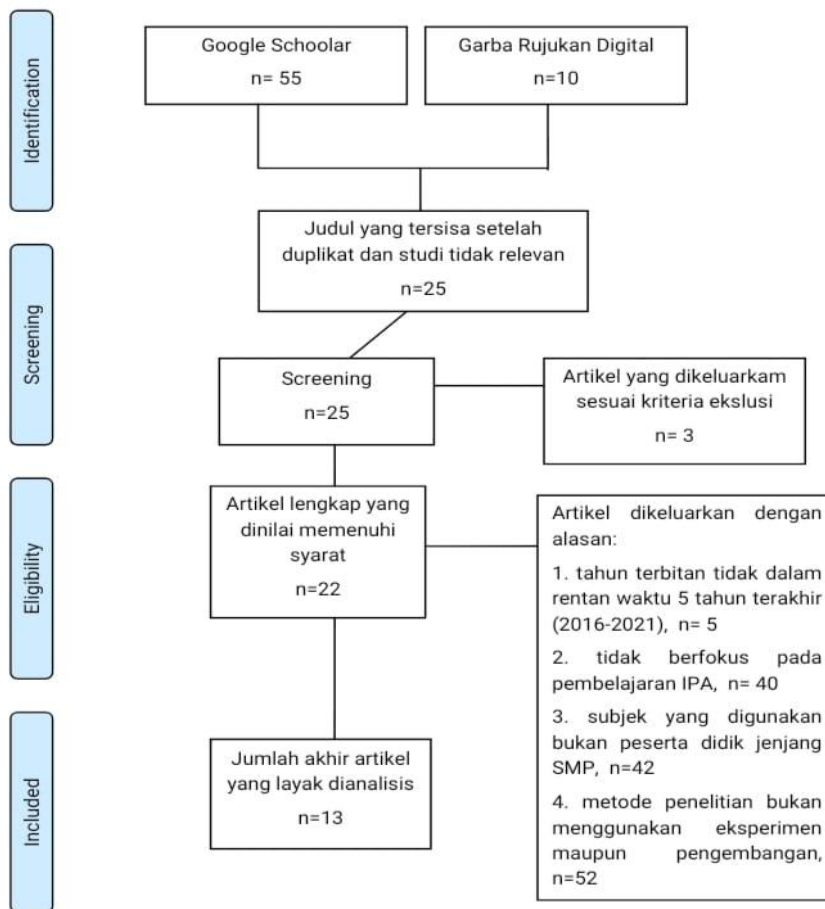


Fig. 1. Prism Diagram

Based on Fig 1 it is known that there are 13 articles worth analyzing. The data analysis technique used is the narrative method (Lin & Cromlay, 2021). The narrative method aims to describe the effectiveness of pedagogical cognitive knowledge in an effort to improve the cognitive abilities of junior high school students.

3. Results and Discussion

Based on the results of the literature review, 13 articles were obtained that are worthy of analysis regarding pedagogical cognitive knowledge in an effort to improve the cognitive abilities of junior high school students. Table 3 shows the influence of pedagogical cognitive knowledge efforts in an effort to improve the cognitive abilities of junior high school students and their references.

Table 3. Pedagogical cognitive knowledge in an effort to improve the cognitive abilities of junior high school students.

Research Title	Types of Research	Reference
Implementation of Pedagogical Content Knowledge (PCK) in Improving Students' Cognitive Abilities	Descriptive Survey	Solihat, A. N., Suminawati, S., & Afriza, E. F. (2019)
SciencePocket Book Assisted Problem-Based Learning Model To Improve Cognitive Abilities and Attitudes Towards Science	Experiment	Satrianingsih, C. J.P., Haryani, S., & Dewi, N. R. (2017)
Application of Experimental Methods in Learning to Improve Cognitive Abilities	Experiment	Khaeriyah, E., Saripudin, A., & Kartiyawati, R. (2018)
Research Title	Types of Research	Reference

Research Title	Types of Research	Reference
Methods of Playing in a Circle to Improve Cognitive Abilities	Class Actions	Pahrul, Y., & Amalia, R (2021)
Improving Students' Cognitive Abilities Through Practicum Methods With Interactive Powerpoint Media	Class Actions	Yuliana, I., & Hastiana, Y (2019)
Efforts to Improve Cognitive Abilities Through Snakes and Ladders Games	Class Actions	Astuti, F., & Alaby, M. A. (2019)
Contribution of Consyuktivist Games (Beam Media) With Improved Cognitive Abilities	Class Actions	Rachmat, F., (2017)
Learning With a Cognitive Style-Based Contextual Approach To Improve Students' Cognitive Abilities	Class Actions	Zakiah, N. E (2017)
Innovation of Inquiry Learning Model to Improve Cognitive Ability of Junior High School Students	Class Actions	Febriastuti, Y. D. (2019)
Inquiry Guided Learning Model Innovation To Improve Cognitive Abilities Of Junior High School Students	Class Actions	Febriastuti, Y. D. (2019)
Utilization of Learning Media in the Learning Process to Improve Students' Cognitive Abilities	Qualitative	Indriyani, L. (2019)
Students' Cognitive Abilities and Creative Thinking Through Stem-Adjacent Project-Based Learning	One Shot Case Study	Sumarni, W., Wijayati, N., & Supanti, S. (2019)
Utilization of Learning Media in the Learning Process to Improve Students' Cognitive Thinking Ability	Combination (Mix Method)	Alfiah, A. N., Son, N. M. D., & Subali, B. (2018)

The influence of pedagogical cognitive knowledge in an effort to improve the cognitive abilities of junior high school students in table 3 can be described in the form of a graph in Fig 2.

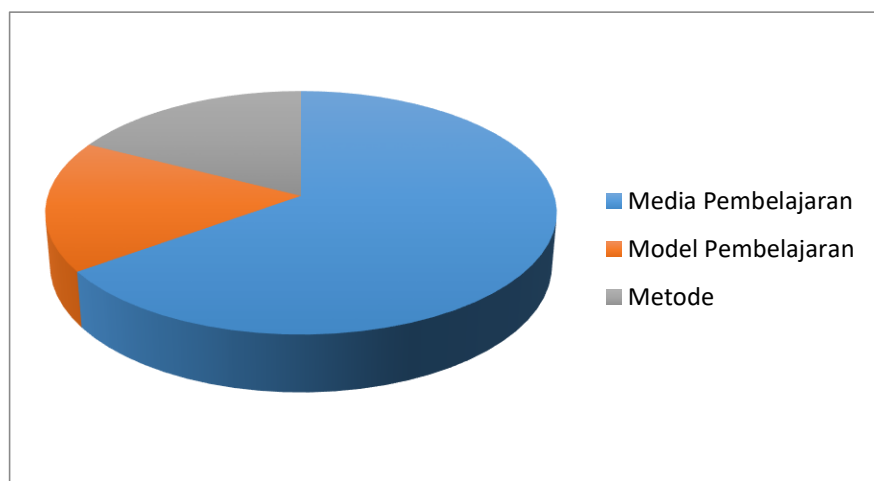


Fig. 2. The influence of pedagogical cognitive knowledge

Fig 2 shows that to improve cognitive skills it is more dominant to use learning media. This is because learning media can improve students' cognitive abilities. This data illustrates that in the 2015-2021 period, articles discussing pedagogical cognitive knowledge still do not improve students' cognitive abilities. Efforts to improve students' cognitive abilities are through learning media (Rachmat, 2017). The types of research that researchers use in determining students' cognitive abilities are presented in Table 4. The type of research that is often used to improve students' cognitive abilities in table 3 can be described in the form of a diagram in Fig 3 as follows. Figure 3 shows that the research method often used by previous researchers regarding the study of pedagogical cognitive knowledge in an effort to improve the cognitive abilities of junior high school students is the Action Research method Class. This is because the implementation of the class action method is very helpful for students in the learning process (Yuliana, 2019).

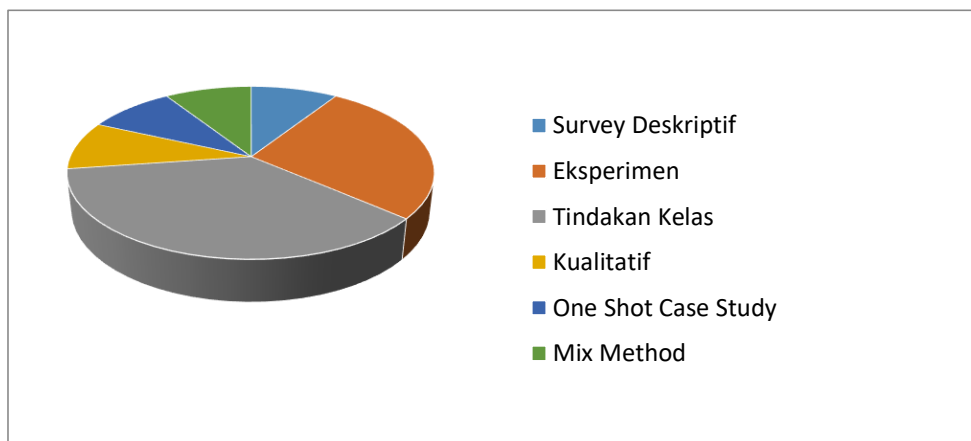


Fig. 3. Research method often used by previous researchers

In the constructivist view, teaching is not just a transfer of knowledge, it is an activity that allows learners to form their own knowledge. It is on this basis that a teacher is obliged to have effective, appropriate and appropriate knowledge and pedagogy materials to teach siswa easily. (Van Driel et al, 2010) with the term Pedagogical Content Knowledge (PCK). Knowledge of pedagogical content already exists knowledge that is important for an educator in teaching. (Williams & Lockley, 2012) Pedagogical Content Knowledge (PCK) is very important for reach in the process of developing science literacy and the ability to transform educator knowledge into the learning process. In addition, pedagogical content knowledge is important for teachers because it can create useful learning for students (Margiyono & (Mampouw, 2011). Abbitt (2011) defines pedagogical cognitive knowledge as knowledge of pedagogy, learning practices and learning planning, as well as appropriate methods for teaching suatu material. Pedagogical cognitive knowledge includes ways that can present or formulate material so as to form other people's understanding. Understanding in this case is an understanding of the causes of a certain topic's learning material being difficult or mudah (level of material difficulty) (Turnuklu & Yesildere, 2007). So on this subject pedagogical cognitive knowledge already exists the ability of a person educator to transfer knowledge to learners. Each lesson must be well designed to impart cognitive abilities to students (Horward, 2015). According to Anderson(2001), cognitive ability is a mental activity related to the ability to think. Cognitive abilities are very important for students, because they provide information on how students master the concepts learned. Based on the Indonesian curriculum, cognitive abilities become important effects as targets in learning objectives. In general, students still have difficulty in mastering learning concepts (ugulu, 2016).

Cognitive skills have an important role in education because cognitive abilities are students who can think, understand, and explore things around them and are able to solve problems (Eti Nurhayati, 2011). According to Ramaikis Jawati (2013) that the development of cognitive abilities of students can be seen from what they do, a huge impulse of curiosity in learners. Cognitive abilities quickly develop when going through the game process. In cognitive effectiveness, learning to represent mental events (Suprijono, 2012). One way that can be done to find out the abilities of prospective teachers already exists is to analyze their abilities in analyzing the work of students so that thinking knowledge can be known. siswa in solving the problem (Sulastris, 2016). The PCK contained in the rubric analyzes the work of students from Koirala, et al (2007), namely 1) content knowledge and skills, 2) analysis of student work, and 3) feedback to students. Content Pedagogis (PCK) knowledge is described as the relationship between basic knowledge of content and pedagogy using the three expected context origins (Hurrel, 2013).

4. Conclusion

Cognitive ability means that students can think, know, and explore things around them. They have the knowledge and ability to solve problems, as well as the capacity to understand the world. Cognitive ability has an important role in education because cognitive ability means that students can think, understand, and explore things around them.

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