

The effectiveness of collaborative learning on civic education problem-solving abilities based on cognitive styles

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Abstract: Problem-solving ability is one of the competencies that individuals must have as a provision to face increasingly complex problems. This study aims to determine the effect of the application of the Collaborative Learning (CL) model on the problem-solving ability of civic education based on the cognitive style of students. This study applies the quantitative research paradigm with a quasi-experimental design. The research subjects were 162 students selected by cluster random sampling technique from two private universities in Surabaya, Indonesia. Data collection techniques use Cognitive Style Inventory (CoSI) and Problem Solving Inventory (PSI). The data were analyzed using an independent sample t test technique with SPSS software. The results showed that the application of the CL model had a significant effect on the problem-solving ability of civic education in students. The field independent (FI) cognitive style shows higher problem-solving ability than the field dependent (FD) in both the application of the CL model and the Cooperative Learning (CpL) model. In the learning process, it is recommended that educators apply the CL model as an alternative in improving the problem-solving ability of civic education by paying attention to the cognitive style of students.

Keywords: cognitive style; collaborative learning; cooperative learning; problem

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1. Introduction

Problem-solving ability is one of the core competencies that 21st-century individuals must possess (National Education Association, 2014; Ontario, 2016). Globalization and today's technological revolution have driven fundamental changes in various areas of life (Schwab, 2016). Problem solving can be defined as the ability of each individual to complete tasks well (González-pérez & Ramírez-montoya, 2022). This change is reflected in daily problems that are dynamic, transparent, and complex, so students need to be equipped Troubleshooting capabilities (Greiff et al., 2014). Individuals must have problem-solving skills in order to be able to adapt to social life and various changes (Ozus et al., 2015).

Problem solving in cognitive skills is part of the level higher order thinking skills. Problem solving is one type of important cognitive processing and even a key process in learning (Schunk, 2012). In the domain of cognitive prowess or intellectual skills, Gagne places problem-solving at the highest level. The four intellectual skills under him hierarchically include: discriminations are prerequisites for concrete and defined concepts, simple rules, complex higher order rules (Sutomo, 2017).

Problem-solving ability reflects the capacity that individuals have in using their knowledge, skills, and understanding to respond to the demands of new situations or nonautomatic (Wismath & Orr, 2015) To help individuals find, formulate problem solving and make the right decisions requires thinking activities. Critical thinking skills are needed by individuals to be able to find problems and creative thinking skills are needed to be able to solve problems. When solving problems individuals need to use one or more

higher-order thought processes (Saraswati, 2020). Problem-solving activities also encourage learners to be more involved in the process of increasing the use of higher order thinking skills processes (Hooda & Devi, 2014).

Effective problem solvers exhibit several characteristics, among which they tend to use a variety of heuristic strategies (Hooda & Devi, 2014), follow a few steps while troubleshooting (Setiawan, 2024) have good counting or predicting skills, have confidence in one's own abilities, tend to check answers or self-control over reasonableness and are able to predict an answer, and usually gain an understanding of a problem before trying to solve it.

High school and higher education graduates still do not demonstrate the expected critical thinking and problem-solving competencies. Similar problems also occur in the quality of higher education graduates in Indonesia, including lack of ability higher order thinking skills (Kemenristekdikti, 2016). The expected competence has not been achieved due to the suboptimal learning process.

Civic Education is a subject that has a very strategic position in the formation of nation and character building. Civic education learning outcomes are: (a) developing political literacy, (b) acquiring critical thinking and analytical skills, (c) developing values, attitudes, and behaviors, and (d) encouraging active participation of schools and communities (Guerin, 2018). Explicitly one of the learning outcomes of civic education in Indonesian universities is that students have the ability to solve contextual problems in facing the life of society, nation, and state (Ministry of Education and Culture, 2012). There are several obstacles faced by civic education learning, including students who are less active and consider it unimportant because it is not a scientific field. Learning methods applied by educators tend to be monotonous or less innovative (Widiatmaka, 2016; Hidayah, Ulfah, & Suyitno, 2019).

The development of problem-solving abilities is an important metacognitive skill (Wismath & Orr, 2015). To answer these challenges, the learning paradigm must change towards a way enable learners to acquire the creative thinking, flexible problem solving, collaboration and innovative skills needed to be successful in work and life (Pacific Policy Research Center, 2010). Learning needs to provide opportunities to interact with educators and peers and practice and apply new skills and knowledge (Scott, 2015). Problem-solving skills can be developed through a variety of learning strategies (Pacific Policy Research Center, 2010). Regular learning to promote cooperation, tolerance, an open mind and shared responsibility can improve problem-solving skills (Hooda & Devi, 2014). Collaborative active learning while developing problem-solving skills can be realized through problem-solving-based group learning, such as group work and brainstorming, collaborative and cooperative, as well as inquiry-based and problem-based learning (Wismath & Orr, 2015). The results of the study of civic education learning strategies, students want humanistic learning (Aryana, 2017), constructivism, constructivism, and open ended (Hidayah et al., 2019).

The CL model develops learning by providing small group learning assignments, peer support, diversity of views, knowledge and expertise will help create a pleasant learning climate. The application of the CL model is able to provide several benefits in terms of social and academic benefits. Academically, the CL model is useful for promoting critical thinking skills, active learners in the learning process, and as an appropriate problem-solving technique for learners (Laal & Ghodsi, 2012). Educators and learners combine intellectual effort to explore, understand and solve problems (Mandusic & Blaskovic, 2015). Knowledge as something that is built by talking together to reach agreement. Judging from social benefits, the application of the CL model can encourage educators to provide real experience to students by encouraging the development of skills such as coordination, communication, conflict resolution, decision making, problem solving, and negotiation (Lai, 2011). The application of the CL model encourages learners to take substantive responsibility for working together, as there is a shift in responsibility for

learning from educators to learners, as well as for building shared knowledge, achieving common goals through their interaction with each other (Davidson & Major, 2014).

Several previous relevant empirical studies corroborated the above opinion. The group of students with the CL model has higher learning achievement than the group of students competitively. Students with the CL model have better critical thinking skills than students who learn competitively (Respati, 2018). Similar studies have shown that there are significant differences in problem-solving skills between learners taught using CL strategies and those taught using conventional methods (Adolphus, Alamina, & Aderonmu (2013). The CL model also has a strong influence on critical thinking through discussion, debate and assessment of different conclusions (Law et al., 2017).

Another model equivalent to the CL model is the CpL model. Both of these learning models are based on cooperation in small groups and represent a learner-centered approach to learning (Jacobs, 2014). The differences between the two models can be reviewed based on the mechanism and structure of group work, approach, and methodology. Based on the mechanism of group work, the CpL model is more directive than the CL model, group work is strictly controlled by educators. Although there are many mechanisms for group analysis and introspection, the CPL model is more educator-centered whereas the CL model is more learner-centered. The CpL model follows a traditional learning path where educators still maintain authority and learners remain passive. The CL model has its basis in social constructivism. Educators and learners work together socially in order to build knowledge. The CpL model is associated with socio-cultural theory that considers learning as a social process in which learners discuss and construct meaning (Panhwar et al., 2017). The CpL model develops small group learning that is highly structured, systematic, procedural, and controlled by educators. While the CL model develops learning with small groups that are less structured, less systematic, and more controlled by learners (Panhwar et al., 2017).

CpL learning refers to a set of learning methods where learners are encouraged to work together on academic tasks. Students sit together to discuss or help each other complete class assignments that may be quite complicated (Davidson & Major, 2014). The application of the CpL model has a positive impact on learners' ability to solve problems and improve oral communication skills (Widiani, 2021) as well as facilitating learners to develop and practice trust-building, leadership, decision-making, communication, and conflict management skills (Lagur, 2021). Learners who work together tend to understand each other, respect each other and like each other, have more opportunities to develop critical thinking skills and show significant improvement in those thinking skills, improving oral communication skills (Patesan et al., 2016). The results corroborate that the CpL model has succeeded in promoting academic achievement as well as social skills, fostering an attitude of accepting the shortcomings of themselves and other members, and being able to encourage students to learn to think, solve problems, integrate and apply knowledge and skills in groups (Gillies, 2016).

Studies on the application of CL and CpL models in civic education in universities have not been widely conducted. The application of the CpL model is effective in improving student learning outcomes in terms of cognitive and attitude in civic education courses (Usman & Bahraeni, 2016). So far there have been no studies of CL models on civic education, especially related to problem-solving skills.

Various studies on the application of CL and CpL models that have been carried out by researchers are more interested in seeing their effect on the dependent variable by comparing direct learning models or conventional that is competitive and individualistic. Studies on the application of CL and CpL models together began to be carried out. The application of CL or CpL learning in university learning does not show differences based on a qualitative perspective. The two different groups of learners are almost identical no matter the structured or CpL or the self-learning process or CL (Andres, 2015). While researchers in Pakistan tend to justify in teaching English as a second

language (ESL) in higher education with a structured approach to group work as the CpL model contributes more than the CL model (Panhwar et al., 2017).

The success of the learning process needs to consider learning variables, including: learning conditions, learning methods, and learning outcomes. Cognitive style is one of the variables of learning conditions that need to be considered in designing and implementing learning processes such as designing or modifying learning materials, learning objectives, and learning strategies. Cognitive style as the way individuals feel, think, learn, solve problems, and relate to others (Setiawan, 2016). Cognitive styles influence learners' cognition and behavior (Schunk, 2012). Cognitive style is a strategic way that each individual has in responding to the problems they encounter (Silk, Rechkemmer, Daly, Jablokow, & McKilligan, 2021). Differences in cognitive styles relate to individual differences in learning and acceptance of different forms of teaching. Cognitive style is an area of study of educational psychology that is felt to be very important for the advancement of learning technology (Bakar & Ali, 2013). Cognitive style is the tendency of individuals to understand, think, and store information (Setiawan, Purwanto, Parta, & Sisworo, 2020). FI individuals have high analytical skills in understanding and processing information, they are often referred to as "analytical thinkers". FD individuals demonstrate more global and holistic abilities in information perception and processing. They are often called "global thinkers" (Margaret, 2015).

Several empirical studies on the importance of individual cognitive styles in learning have been conducted. Research focusing on the relationship between cognitive styles and learning strategies in China concluded that cognitive styles have a significant influence on the choice of learning strategies (Shi, 2011). The study of 300 college students in India found that there were significant differences and positive associations between cognitive styles and problem-solving abilities (Jena, 2014). Based on several things about what has and has not been done in previous studies, researchers want to examine the application of the CL model to the problem-solving ability of civic education compared to the CpL model by paying attention to differences in cognitive styles of students in higher education

2. Materials and Methods

This research applies the quantitative research paradigm with quasi-experimental methods. DESAIN selected research "the pretest-post-test non-equivalent group design" (Sugiyono, 2014). The selection of research subjects into experimental groups and control groups was based on existing civic education learning classes. The experimental group applied the CL model and the control group applied the CpL model type method Student Team Achievement Division (STAD). The second independent variable is the cognitive style which comprises the FI and FD cognitive styles. The dependent variable is problem-solving ability. The study population is diploma three and undergraduate students from two private universities in Surabaya, Indonesia who program civic education courses, totaling 833. Research samples were taken using techniques cluster random sampling. A total of 162 students. The number of research subjects in the experimental group and the control group was the same, namely 81 students each. Data collection using techniques Cognitive Style Inventory (CoSI) and Problem-Solving Inventory (PSI). The CoSI technique was used to determine the type of FD or FI cognitive style in each study subject. CoSI instruments are scale-shaped Likert which has been validated with a total of 40 items. PSI techniques are used to collect data on students' problem-solving abilities. The PSI instrument is adapted from the PSI instrument developed by Heppner & Petersen (1982) (Marcu, 2015). PSI instruments are scaled Likert. A total of 32 items and have been validated. The PSI instrument is developed based on three constructs, namely: (1) confidence in problem solving, (2) problem-solving management approach or strategy, and (3) personal control.

Data analysis using techniques independent sample t test. This technique is used to test the equivalence of initial abilities, testing the effectiveness of applying the CL model

compared to the CpL model on problem-solving abilities based on cognitive styles. Prerequisite tests include testing normally distributed data using techniques Kolmogorov-Smirnov and test homogeneity of variants using tests Levene.

3. Results

3.1 Cognitive style

Based on data from the CoSI technique, the type of cognitive style of everyone in the CL and CpL model groups was determined as presented in [Table 1](#) below.

Table 1. Cognitive Style Data Based on Learning Models

| No | Learning Model | Cognitive Style | | Sum |
|----|----------------|-----------------|----|-----|
| | | FI | FD | |
| 1 | CLModel | 36 | 45 | 81 |
| 2 | CpLModel | 34 | 47 | 81 |
| | Sum | 70 | 92 | 162 |

[Table 1](#) explains that in the CL model group, the number of individuals who have FI cognitive style is 36 students and individuals who have FD cognitive style is 45 students. In the CpL model group, 34 students had FI cognitive style and 47 students had FD cognitive style. So, the number of individuals who have the cognitive style of FI is 70 students and FD is 92 students.

3.2 Initial troubleshooting capabilities

Pretests of civic education problem-solving skills were carried out on all research subjects. The pretest results were used to test the equality of initial ability between the CL model group and the CpL model group. The mean initial ability of the CL model group was 81.3210 and the CpL model group reached 81.5914. Test results independent sample t-test the initial abilities of both groups are presented in [Table 2](#) below.

Table 2. Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | |
|-------|--------------------------------|--|----------------------------|------------------------------|---------|-----------------|
| | | F | Sig. | t | Df | Sig. (2-tailed) |
| | | pretest | Equal variances assumed | .204 | .652 | -.209 |
| Score | Equal variances not assumed | | | -.209 | 159.188 | .834 |

Based on the results of the Independent Samples Test on the t-test for Equality of Means with a confidence level of 95% shows a Sig. (2-tailed) value of 0.834. The test criteria accept H_0 if the value of Sig. (2-tailed) > 0.05 . Values of $0.834 > 0.05$, it was decided that there was no significant difference in initial ability between the CL model group and the CpL model group. If the two groups show significantly different final abilities, it is concluded that there is an influence of the independent variable on the dependent variable.

3.3 Effectiveness of CL model on educational problem-solving ability citizenship

Problem-solving ability posttest data is used to determine the effectiveness of CL model application by comparing CpL models. The learning outcomes of each group are shown through mean values. The mean final capability of the CL model group reached 101.791 while in the CpL model group reached 92.528. To test the real difference in mean the two groups is used independent sample t test with results presented in [Table 3](#).

Table 3. Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | |
|----------------|-----------------------------|---|------|------------------------------|---------|-----------------|
| | | F | Sig. | t | df | Sig. (2-tailed) |
| Posttest Score | Equal variances assumed | 2.453 | .119 | 8.249 | 160 | .000 |
| | Equal variances not assumed | | | 8.249 | 152.771 | .000 |

The results of the Independent Samples Test in the t-test for Equality of Means with a confidence level of 95% showed a Sig. (2-tailed) value of 0.000. Values of $0.000 < 0.05$, it was decided that there was a significant difference in problem-solving ability in the two groups. The conclusion shows that the application of the CL model has a significant effect on the problem-solving ability of civic education in students.

4. Discussion

In learning by applying the CL and CpL models, the process of solving civic education problems takes place in small, heterogeneous groups, sharing, learning, and working together to achieve mutual success. The mechanisms and approaches of group work to solve problems that distinguish the two (Panhwar et al., 2017). CL model learning facilitates group work to solve civic education problems by giving responsibility and authority to the group, while educators act more as facilitators (Lin, 2015). This mechanism is relevant to the characteristics of students at the tertiary level. In general, they are in the age range of 18 to 24 years or in the period range late adolescence (Swartz, 2012; Kang, Skinner, Sanci, Sawyer, 2013). In the study of developmental psychology, they want freedom from parental domination (educators), show concern in interaction, and be responsible. In cognitive development they seek to demonstrate the ability to do more difficult or challenging things, being able to synthesize information and apply it to oneself, being able to think into the future and anticipate the consequences of his actions (Kang et al., 2013). The characteristics of these learners are more facilitated and developed in this CL model learning. Through collaboration with peers and facilitated by educators, learners engage in intensive problem solving (Sawyer & Obeid, 2017).

In the early stages of learning the CL model, the atmosphere of group work still looks chaotic when compared to the CpL model controlled by educators. In its development, students began to show increased responsibility and autonomy given and began to form a positive and conducive group learning atmosphere (Lin, 2015). They interact and collaborate with each other to determine civic education problems to be solved and distribute their respective tasks, discuss, and present the results in class discussions responsibly. In group work, team members ask each other questions to better understand the problem in depth and each group member gives other members the opportunity to convey their ideas or ideas in a happy and productive atmosphere. In this CL model learners build shared knowledge, work together to achieve common goals, they build problem-solving abilities through interaction with each other (Davidson & Major, 2014). In CpL learning this mechanism is under the control of educators (Panhwar et al., 2017; Sawyer & Obeid, 2017).

Use CL and CpL learning models depend on the maturity level of learners (Panhwar et al., 2017). The successful application of the CpL model in elementary to high school students is not necessarily appropriate to be applied in universities. Students may be less likely to need a structured study group environment. The more structured CpL model is suitable for basic knowledge learning whereas the CL model is relevant for higher levels. The CL model is more suitable to be applied to adult learners (students) than students

The application of the CL model in higher education shows that students can organize

themselves to work productively, share roles and encourage each other to be active in constructing knowledge or solving problems (Harasim, 1993; Panhwar et al., 2017). The CL model is more suitable for student learning and more critical knowledge construction. And students have a lot of accumulated experience that can enrich to work together (Bruffee, 1993; Setiawan, Purwanto, Parta, & Sisworo, 2020).

Another factor that corroborates the results of this study is the characteristics of the content of the field of study or the nature of the problem being solved. Some of the problems solved in the field of civic education include Indonesian national identity, obligations and rights of citizens, human rights, and rule of law. The field of study is based on content characteristics including metacognitive knowledge that requires problem-solving strategies that allow differences in how to solve it between students and between groups or are open-ended (Anderson & Krathwohl, 2001). This problem occurs in the life of society, nation, and state which is real, dynamic, complex. These problems fall into the category of unstructured problems (Brookhart, 2007), ill structured (Jonassen, 2004) or non-routine. The solutions are unpredictable, convergent, interdisciplinary, and involve more cognitive operations (Jonassen, 2004), requires strategy nonautomatic which requires high-level thinking (Brookhart, 2007). Non-routine problems can develop problem-solving skills.

Nature of the problem unstructured problems, ill structured or non-routine is more suitable to be facilitated through the application of the CL model than the CpL model. CpL model learning applies a more suitable methodology to construct basic (fundamental) knowledge by controlling group tasks close-ended question and have specific answers. While the CL model is more suitable for constructing non-fundamental knowledge that requires a critical learning approach or problems whose answers are sometimes ambiguous or controversial.

Problems of a nature open-ended provide opportunities for learners to solve in different ways, seek alternative solutions, and realize their potential to generate different solution. CL model, educators delegate their authority to small groups through more tasks open-ended and complex (Panhwar et al., 2017; Sawyer & Obeid, 2017). This is relevant to the results of studies on civic education learning strategies expected by students in higher education, namely through a learning approach that is open-ended (Hidayah et al., 2019).

CL model learning followed 36 individuals with FI cognitive style and 45 individuals with FD cognitive style. The final ability achieved in the individual group of FI cognitive styles showed a mean of 107.0472 while in FD individuals it reaches a mean of 96.5356. Test results Independent Samples Test with a confidence level of 95% indicates a Sig. (2-tailed) value of 0.000. The value of $0.000 < 0.05$, then based on the test criteria it was decided that there were differences in problem-solving ability in the two groups of cognitive styles. In the application of the CL model, individuals who have the FI cognitive style show significantly superior civic education problem-solving skills than FD individuals.

In learning the CpL model, 34 students and 47 students with FD cognitive style were followed. The final ability in FI cognitive style individuals reached 96.8735 while the mean in FD individuals reached 88.1830. Test results Independent Samples Test with a confidence level of 95% indicates a Sig. (2-tailed) value of 0.000. The value of $0.000 < 0.05$, then based on the criteria it was decided that there were differences in problem-solving ability in both groups of cognitive styles. In the application of the CpL model, individuals who have the FI cognitive style show higher civic education problem-solving abilities than FD individuals.

In this study in both the application of the CL and CpL models, individuals who have the FI cognitive style show that civic education problem-solving abilities are more dominant than FD individuals. The application of both learning models does not depend on cognitive styles. The existence of cognitive styles becomes the dominant variable in achieving problem-solving abilities. The underlying cognitive style may be much more permanent and persuasive depending on its strength (Pithers, 2002).

Cognitive style is considered the mode by which individuals approach, acquire and process information, as well as including the consistent way in which individuals store and retrieve information (Pithers, 2002). Further Pithers asserts that cognitive styles concern how individuals perceive, think, solve problems and learn. A similar opinion is put forward that cognitive styles are stable characteristics in which individuals acquire, organize, and use information to solve problems and make decisions (Mawad et al., 2015). While cognitive styles represent dimensions of individual differences in the cognitive sphere, are relatively fixed (constant) and can influence a person's behavior, processing strategies can be used depending on the demands of the task (Armstrong et al., 2012).

This study examines a pair of cognitive styles based on the psychological differences suggested Witkin et al. (1977), that is, cognitive style field independent (FI) and field dependent (FD). This pair of cognitive styles is a continuum consisting of conceptual and intellectual activities with two distinct poles. Some researchers have described the differences between the two cognitive styles, including Witkin et al. (1977); Pithers (2002).

FI individuals tend to exhibit different attitudes and behaviors from FD individuals when it comes to problem solving. FI individuals have high analytical skills and depth in understanding and processing information, they are often referred to as "analytical thinkers". FI individuals show a tendency to organize information into manageable units and have a greater capacity to store information. They prefer and are able to use problem-solving, organizing, analyzing and structuring techniques when involved in learning and work situations (Margaret, 2015). FI individuals are able to see objects apart from their context, solve new problems presented and organized in different contexts, and are more independent in making decisions (Pithers, 2002). They have characteristics in line with a systematic style that has advantages related to logic, rational behavior that uses step by step, systematic thinking, learning problem solving, and decision making (Martin, 1998).

FD individuals demonstrate more global and holistic abilities in information perception and processing. They are often called "global thinkers." They tend to accept information as it is presented or encountered and rely heavily on rote memorization. They also manifest a clear tendency to use sound frames of reference to determine his attitudes, feelings and beliefs (Margaret, 2015). They have higher social skills and tend to like situations that require direct communication with others (Andreu, 2015). FD individuals have characteristics that are in line with intuitive styles, such as: thinking with a spontaneous, holistic, and visual approach (Martin, 1998).

Solving problems in the field of civic education that occur in everyday life, dynamic, and complex or also called unstructured problems, ill structured or non-routine requires strategy nonautomatic which requires high-level thinking such as: analysis, synthesis, and generalization (Brookhart, 2007) as well as involving more cognitive operations (Pateşan, 2016). Such cognitive operations have two important attributes. First, problem solving requires a mental representation of the problem and its context. That is, the individual builds a mental representation (mental model) of the problem, known as the problem space. The mental model consists of knowledge of the structure of the problem, knowledge of how to conduct tests and other problem-solving activities, the problem environment, and its constituent parts, as well as knowledge of when and how to use procedures. Second, successful problem solving requires individuals to actively manipulate and test models that have been used (Jonassen, 2004.)

There are four main subprocesses in problem solving that require all metacognition skills: representing (identifying) problems, planning problem-solving strategies, overcoming obstacles (alternative problem-solving), and executing problem-solving plans. In addition, metacognitive skills are required in monitoring and evaluating decision making (Gredler, 2009; Secil, 2017). FI individuals have a tendency to better cognition settings than FD individuals. With deep analytical thinking skills, FI individuals demonstrate good metacognitive skills and with learning independence and high intrinsic motivation will demonstrate good metacognitive strategies.

With the capital owned by FI individuals as analytical thinkers, they demonstrate better problem-solving skills than FD individuals. FI individual inclined Have confidence in one's own problem-solving abilities, have good counting or predicting skills, be able to predict an answer, be able to use various heuristic strategies, follow several steps (skillfully) when problem solving, tend to check answers or self-control over reasonableness, and usually understand problems before trying to solve them. FD individuals are able to understand problems but cannot create specific problem-solving plans that require in-depth analysis, cannot properly execute plans on certain questions that require further analysis and can look back at the answers but cannot correct errors (Marwazi, Made, and Putra, 2019).

The results of this study corroborate several previous empirical studies. There is a relationship between the strengths of FI students and problem-solving performance, where the solution depends on the individual using critical elements in a different context than the one in which the elements were originally presented, thus demonstrating the relationship between analytical ability and structuring (Pithers, 2002; Post, 2010). The learning outcomes of solving mathematical problems obtained by students who have the FI cognitive style are superior to students who have the FD cognitive style (Sudarman et al., 2016). Another study showed significant differences and positive associations between cognitive style and problem-solving ability in 300 college students in India (Jena, 2014).

5. Conclusions

This study shows that the application of the CL model has a significant effect on the problem-solving ability of civic education. The achievement of problem-solving ability with the application of the CpL model is higher than the CpL model. In the application of the CL model and the CpL model, the problem-solving ability of individuals who have the FI cognitive style is superior to individuals who have the FD cognitive style.

Based on the results of the study, it is recommended that educators apply the CL model as a strategy to increase the problem-solving ability of civic education by considering the characteristics, nature of the problem, and characteristics of students. The cognitive style of learners needs to be considered in improving the problem-solving ability of civic education. Researchers are further advised to conduct many studies on the application of the CL model to students in higher education.

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