

The Effect of a Student's Major and Achievement Motivation on their Ability to solve Citizenship Problems

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This study aims to determine differences in the ability to solve citizenship problems in students who have different backgrounds in their majors and in their achievement motivation. It also aims to investigate the interaction between a student's major and their achievement motivation, specifically determining whether it affects their ability to solve citizenship problems. The design of this study was to use a non-experimental causal-comparative research design. The research sample consisted of 74 students: 20 students from the Mathematics department, 18 students majoring in Chemistry, 19 students majoring in Physics and 17 students majoring in Engineering. Determination of the sample was done by a purposive sampling technique. Data collection was done by tests and use of a Likert scale. Data analysis used Analysis of Variance (ANOVA) 2x2 factorial design. The results of this study point to; 1) There is no difference in the ability to solve national citizenship problems in students majoring in Mathematics, Chemistry, Physics and Engineering; 2) There are differences in the ability to solve citizenship problems in students majoring in Mathematics, Chemistry, Physics and Engineering who have low and high achievement motivation, as is evident by the significance value being smaller than the real level ($0,000 < 0.050$). 3) There is no interaction between differences in their major and the student's motivation on their ability to solve civic problems. This study shows that the ability to solve citizenship problems in Engineering majors and other natural science majors is not different, and as such it is possible to teach the ability with the same learning methods, and specifically the same problem-solving learning model. Students who have high achievement motivation have better problem-solving abilities, therefore teachers should encourage collaborative learning so that students collaborate in problem solving.

Key words: *Majors background, achievement motivation, problem-solving.*

Introduction

Citizenship Education (CE) is always based on values in life (Komalasari & Saripudin, 2017). The implementation of Civics is attempted contextually, so as to identify problems, and encourage students to find alternative solutions to problems (Komara, 2017). Global awareness, critical thinking and Civics problem-solving skills are important within a 21st century relevant skill framework (Danju & Uzunboylu, 2016). Involving people in the problem-solving process is also vital in creating active citizenship (Poudrier, 2017). Schools in Asia, in the field of Civics, have already begun with problem-solving strategies in groups (Print & Smith, 2000).

The CE curriculum in general is broad in scope (Tonge, Mycock, & Jeffery, 2012). In Indonesia the CE Curriculum for tertiary institutions invoked problem-solving namely in; 1) values and norms, 2) civic and state obligations and rights, 3) democracy, 4) socio-political, cultural dynamics, 5) national identity, 6) national integration, and 7) national resilience (Paristiyanti, Saksama, Winataputra, Budimansyah, & Sapriya, 2016). This is almost the same as the social studies curriculum in Turkey, which aims to foster in its citizens the ability to be active and think democratically, to have respect for justice, to have independence, peace, solidarity, tolerance, freedom, and respect, and to show critical thinking skills, problem-solving skills, social participation, and empathy (Bursa & Ersoy, 2016). The Indonesian Government's policy in implementing CE in schools is carried out with an integrated curriculum, where students are encouraged to increase attention to their social reality (Japar, 2018).

CE embodies the education of community members in accordance with the socio-political order (Biesta, 2009). It is hoped to function effectively in local, national and global contexts (Banks, 2008). The social, political, cultural and religious conditions of each nation and state are different, so CE in each country is also different. The difference can be seen in the content / material, as well as the implementation and evaluation. Learning is not just a life skill, but an understanding, and skills are needed by citizens. (Arthur & Bohlin, 2005). The notion of global citizenship urges individuals to consider global problems as part of the challenges and draws connections between national and global problems (Leek, 2016). The mission of school citizenship education is to prepare students to be able to analyse, evaluate, assess, and solve contemporary citizenship problems (Maguth & Koskey, 2019).

The process of finding solutions to difficult or complex problems is problem-solving (Malele, 2019). The results of research on problem-solving in the field of CE have not been found. Some research results, for example by Ahyar, Sihkabuden, & Soepriyanto (2019), explain that the application of the PBL model can foster awareness and ability to solve CE in students. The ability to solve CE problems in the aspect of human rights can be enhanced

through the problem-based learning model (Neldison, 2014). An active CE program was developed to assist learning citizens in solving problems in their communities (Poudrier, 2017). But in other fields of research, problem-solving has been studied done a lot. Rahman & Hassan, (2017) explained that problem-solving is very important in influencing learning achievement. Considering the rationale mentioned above, problem-solving in the field of CE needs to be researched, specifically regarding students with a background in Science-Technology.

In Indonesia, the recruitment of prospective new students involves nationally grouping two major groups, namely Science-Technology and Social-Humanities. Science-Technology is a group of natural sciences, while Social-Humanities is a group of social sciences and humanities. From these two large groups students choose various scientific fields which are often called majors or fields of study. Students who choose a major are students who are aware of their interests, and their talents within the department. Therefore, the department a student has chosen will affect their learning outcomes, including aspects of their problem-solving in the field of CE. For this reason, this research focusses on groups of students majoring in Science-Technology in solving citizenship problems. According to experience found in the field, students majoring in Science-Technology have a low interest and motivation to study in Civics courses; this also allows for the analysis of the achievement motivation aspect in solving citizenship problems.

Several research results in Indonesia on the selection of majors have revealed mixed findings. (Masriah, Malay, & Fitriani, 2018) concluded that choosing a major in a tertiary institution was very important because the chosen major determined their future. The selection of a major for each student has a positive relationship with his understanding (Yustiana, Holilulloh, & Nurmalisa, 2014). The background of a student interaction with their major, before entering the tertiary level, also influences their learning outcomes in tertiary institutions (Zanthy, 2016). The choice of a major for tertiary education is related to student perception, self-concept and interest (Masriah et al., 2018).

In learning activities, there needs to be a thorough analysis of the motives, drivers, needs, and interests in learning ((Lukianova, 2016). The results of other studies by (Yu, Zhang, Nunes, & Levesque-Bristol, 2018) conclude that the choice of major by each student becomes important for their career. Every freshman is also important, considering the interest factor in the field of science / major they choose (Malgwi, Howe, & Burnaby, 2005) Students who aspire to be financially established are more likely to choose business majors (Leppel, Williams , & Waldauer, 2001). The choice of major or field of study by students is influenced by many factors, namely factors of interest, peers, family, academic ability, major reputation, job availability, and also their achievement motivation (Shekhar & Devi, 2012). In another context, Cassidy (2000) explains that the development of one's identity is also influenced by

their achievement motivation. By paying attention to the major or field of study as reflective of the identity of each student, it can be seen that students in the field of Science-Technology are less able to solve citizenship problems included in Social-Humanities. Likewise, students majoring in Science-Technology do not have high achievement motivation, because solving citizenship problems is not their area of expertise.

Achievement motivation is the desire to attain success and participate in an activity where success is determined by his own efforts and abilities (Slavin, 2006). The consistency of individuals struggling in a competition to achieve success, according to excellence standards, is a motivation for achievement (Sarangi, 2015). The academic achievement aspect is also a domain of achievement motivation (Duda & Nicholls, 1992). Learning models can also affect achievement motivation (Thaer & Thaer, 2016). From the explanation of this concept, it can be understood that achievement motivation is always related to the achievement of a person in any aspect of an activity that can be measured by the achievement of that activity.

The results of research on achievement motivation related to learning achievement have been carried out in various subjects. The relationship of achievement motivation with such learning outcomes is seen in (Deci, Vallerand, Pelletier, & Ryan, 1991). Achievement motivation correlates with self-conception of academics (Marsh & Ayotte, 2003). Science students have higher achievement motivation compared with Social Sciences, Humanities and Trade students (Upadhyay & Tiwari, 2009). Meanwhile the results of research on the effect of achievement motivation on problem-solving abilities have not been found. One of the results of the research of Surur & Tartilla (2019), concluded that there was a significant influence on achievement motivation regarding students' problem-solving abilities. Achievement motivation is related to mathematical problem-solving abilities (Stanly, 2014), (Cloud, Ghazala, & Anjum, 2011) and (DeCaro, DeCaro, & Rittle-Johnson, 2015). In the field of psychology, (Masoudi, Mirzae, Aminpoor, Hafeznia, & Majd, 2016) concluded that achievement motivation is related to problem-solving abilities. Meanwhile, in the field of citizenship education, the results of research that examines the relationship between achievement motivation and problem-solving abilities has not been undertaken.

Noting the above research results, this study focusses on investigating the ability to solve citizenship problems in students with different majors and their motivation for achievement. This study is expected to contribute to the literature, especially on aspects of solving the problems of citizenship in students with a background in Science-Technology. To find the the following questions were posed.

1. Does the difference in a student's major affect their ability to solve citizenship problems.
2. Does the difference in the achievement motivation of students affect their ability to solve citizenship problems.

3. Does the difference in a student's major and their achievement motivation simultaneously affect their ability to solve citizenship problems.

Method

This study uses a non-experimental causal-comparative research design. (Gall, Gall, & Borg, 2002) explains that causal-comparative research is a type of non-experimental research that investigates causal relationships by forming groups of individuals where independent variables either exist at several levels or are not present, and then determining whether these have an effect on the dependent variable. In this study the individual groups referred to are the different majors and levels of achievement motivation in students as the cause variable, and the ability to solve citizenship problems is the result variable.

The study population consisted of all students taking Civics courses in the even semester 2018/2019, amounting to 710 students, consisting of 21 classes. Samples were taken in 2 classes, with as many as 74 students, using the Purposive Sampling technique. Purposive sampling is based on the consideration that the two classes that were the subject of this study were students with backgrounds in Mathematics, Physics, Chemistry and Engineering, in accordance with the research objectives. Another consideration is that both classes were taught by the same lecturer, using the same method, and were evaluated in the same way by measuring their citizenship problem-solving ability. The research sample can be described as follows.

Table 1: Research sample

Achievement motivation	Sample				Total
	Mathematics	Chemistry	Physics	Technique	
Low	11	10	9	8	39
High	9	8	10	9	39
Total	20	18	19	17	74

Data were collected using a questionnaire and test instrument. Achievement motivation data was taken with the aim of grouping students into those who have high achievement motivation and those with low achievement motivation. The instrument used was the achievement motivation questionnaire. Achievement motivation in this study was placed as a moderating variable that influences the dependent variables. Data on the ability to solve citizenship problems was collected using subjective test instruments, namely essay tests, which were conducted to measure students' ability in solving citizenship problems.

Analysis of the data of this study used ANOVA (Analysis of Variance). Factorial Analysis of Variance 2x2 was used to analyse the influence of independent variables, namely the

background of the department, and the moderator variable, achievement motivation, on the dependent variable, namely the ability to solve citizenship problems. Furthermore, the ANOVA test used the Statistical Product and Service Solution (SPSS) program version 25.0. In carrying out this ANOVA test, a normality test and a data homogeneity test were conducted first.

The basis for decision making from the Kolmogorov-Smirnov test uses a significance value (p-value). The significance value of the test results being greater than alpha of 5% indicates that the data used were normally distributed.

Table 2: Test normality of research data

	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
The Problem-Solving Capability of Citizenship	.096	74	.092

Based on the table above, from testing the assumption of normality using the Kolmogorov-Smirnov method, the significance value (p-value) for all majors is greater than 0.05 so it can be concluded that the results of the study are normally distributed.

This study used the Levene test method to compare groups of students on average to determine the presence of homogeneous variations. The basis for decision-making from this test used the significance value (p-value). The significance value of the test results being greater than alpha by 5% shows that the variation between groups of students is homogeneous.

Table 3: Variety homogeneity test

F	df1	df2	Sig.
0,226	3	70	0,878

Based on the table above, the significance value (value) of the Levene test is greater than 0.05 so that it can be concluded that the results of the study have a homogeneous range of values between the groups to be compared. Based on the results of the normality test and the homogeneity test, it can be concluded that the data can be considered for the ANOVA test. The results of data processing are explained in the results of the study.

Results

Effect of Major's Background on Problem-Solving Skills

The results of research on the ability to solve citizenship problems between students majoring in Mathematics, majoring in Chemistry, majoring in Physics and students majoring in

Engineering did not differ significantly. This can be seen in the descriptive statistical test results table.

Table 4: Differences in problem solving abilities between majors

Majors	Mean	SD
Mathematics	81.15	6.343
Chemistry	77.83	6.741
Physics	81.16	5.470
Technique	81.65	5.766
Total	80.46	6.165

In the table above, the highest average value of Citizenship Problem-Solving Ability based on major is in the Mathematics major group, and the lowest average is in the Engineering major. Data from the table above shows that there are very small differences between each department regarding student ability to solve citizenship problems. Further tests using ANOVA prove that there is no difference in the ability to solve citizenship problems in students of different backgrounds. This is as seen in the ANOVA test table as follows.

Table 5: ANOVA test differences in problem-solving skills between majors

Sources of Diversity	Number of Squares	free degrees	Middle Squared	F_h	Sig.	F_t
Majors	135.845	3	45.282	1.630	0.191	2.740

Based on the table above, the Department factor obtained an F_h value of 1.630 with a significance value of 0.191. From the distribution table F with db $n_1 = 3$ and $n_2 = 66$ obtained F_t of 2.740 If a comparison is made then F_h is smaller than F_t ($1,630 < 2.74$) or the significance value is greater than the real level ($0.191 > 0.050$). From this test it can be concluded that there is no difference in the Citizenship Problem-Solving Capability between majors.

Effect of Achievement Motivation on Problem-Solving Skills

The results of research on the ability to solve citizenship problems in students who have different achievement motivations are shown in the table below.

Table 6: Differences in problem-solving abilities of students who have different achievement motivations

Department	Achievement motivation	Problem-solving skill
		Mean \pm SD
Mathematics	Low	77,82 \pm 5,67
	High	85,22 \pm 4,63
Chemistry	Low	75,00 \pm 6,05
	High	81,38 \pm 4,63
Physics	Low	78,22 \pm 4,54
	High	83,80 \pm 5,00
Technique	Low	78,25 \pm 5,52
	High	84,67 \pm 4,24
Total	Low	77,26 \pm 5,45
	High	83,83 \pm 5,00

From the table above it can be seen that the problem-solving abilities of students who have high achievement motivation and students who have low achievement motivation are very different. Students with high achievement motivation have higher citizenship problem-solving abilities compared to students who have low achievement motivation. The results are more clearly seen from the ANOVA test as in the table below.

Table 7: Anova test differences in problem solving skills in students who have different achievement motivation

Sources of Diversity	Number of Squares	free degrees	Middle Squared	F_h	Sig.	F_t 5%
Achievement motivation	759.826	1	759.826	27.348	.000	3,991

The table above shows that the achievement motivation obtained F_h value of 27,348 with a significance value of 0,000. From the distribution table F with db $n_1 = 1$ and $n_2 = 66$ obtained F_t of 3.991. If the comparison is done, then F_h is greater than F_t ($27,348 > 3,991$) or the significance value is smaller than the real level ($0,000 < 0,050$). From this test it can be concluded that there is a difference in the Citizenship Problem-Solving Ability between students who have high achievement motivation and students who have low achievement motivation.

The Interaction of Student Majors and Achievement Motivation on the Ability to Solve Citizenship Problems

ANOVA test used the F_h value and the significance value (p-value). Proof of the interaction between the major and achievement motivation can be seen in the ANOVA table as follows.

Table 8: ANOVA test for the interaction between differences in scores and achievement motivation related to problem-solving abilities in students

Sources of Diversity	Number of Squares	free degrees	Middle Squared	F_h	Sig.	$F_t 5\%$
Departement	135.845	3	45.282	1.630	.191	2,740
Achievement motivation	759.826	1	759.826	27.348	.000	3,991
Departement * Achievement motivation	8.138	3	2.713	.098	.961	2,740
Galat	1833.722	66	27.784			
Corrected Total	2774.378	73				

In the interaction factor, the F_h value of 0.098 was obtained with a significance value of 0.961. From the distribution table, F with db $n_1 = 3$ and $n_2 = 66$ obtained F_t of 2.740. If the comparison is done, then F_h is smaller than F_t ($0.098 < 2.740$) or the significance value is greater than the real level ($0.961 > 0.050$). From this test it can be concluded that there is no interactive effect on the Problem-Solving of Citizenship Capability.

Discussion

Problem-solving is one of humanity’s competencies in the 21st century. Citizenship education also presents the problems of citizens as one that needs to be solved. In this study the solution to the problem of citizenship was focussed on the problem of conflict, and radical actions carried out by certain groups in Indonesia. This is because the Civics Education given to students always adjusts to the dynamics and challenges related to the attitudes and behaviours of citizens (Paristiyanti et al., 2016). Citizenship Education, as part of social studies, always seeks to integrate education in order to improve citizens' attitudes (Rahman, H., et al., 2017). The attitudes and behaviours of citizens in the life of the nation and state that are not in accordance with national values, norms and constitutions become citizenship issues and it is important for students from various majors to solve them.

The findings show that; First, the ability to solve citizenship problems does not differ from one department to another. These results are in line with previous findings, which conclude

that the problem-solving ability of secondary school students is no different in terms of gender, region, and institution (Praveen, 2018). The results of other studies support this study which says that the choice of major by students is more caused by interest, peer influence, family pressure, academic ability, departmental reputation, and job availability (Ahmadi, Fathi-Ashtiani, Ghaffari, & Hossein-Abadi, 2009). In addition, the level of maturity and the social environment of students have an effect on the implementation of citizenship education (Ersoy, 2014). Students' problem-solving abilities are influenced by situation-based learning strategies (Utari et al., 2019), and problem-based learning strategies (Asykin et al., 2019). In this case it can be understood that their problem-solving ability is more likely to be influenced by the learning strategy factor than the background factor of the student's field of science.

The ability of students majoring in Science-Technology, in this case represented by the majors of Mathematics, Chemistry, Physics and Engineering, were apparently not different in solving the problems of citizenship. The essay test results can be illustrated that students generally understand the problems that have occurred in Indonesia so far, especially the problem of conflict and radical actions carried out by certain groups. But, in the context of solving the problem of citizenship which is focussed on the problem of conflict and radical behaviour that occurs in Indonesia, responses were of a low quality. Students were not able to provide creative ideas that could contribute to solving problems that occur in Indonesia. This finding is reasonable, considering that students from the Science-Technology departments provide views that are not in-depth as they lack the knowledge of those from the Social-Humanities departments. As a student with a background in Science-Technology is considered to possess strong abilities in solving problems that occur in his country, they should be citizens who show a sense of shared responsibility for the interests of the nation.

The second finding was that students who have high achievement motivation and those who have low achievement motivation differ in their ability to solve Citizenship Problems. This means that students from high achievement motivation groups have better citizenship-solving skills compared with groups of students who have low achievement motivation. This finding is in line with the conclusion that holds that the level of achievement motivation between individuals is different, (Brunstein & Heckhausen, 2018; Zhou & Bao, 2018). Other findings conclude that students who have high achievement motivation are influenced by many aspects, one of which is learning (Wang, 2012), learning behaviours (Bakadorova & Raufelder, 2014), role orientation, and performance (Gralewski & Rodgon, 1980). The results of the study are also in line with previous conclusions by Vollmer & Kaufmann, (1975) who say that high and low achievement motivation groups differ in problem-solving abilities. The findings are also supported by research findings which explain that measures of educational success are more influenced by problem-solving styles and by achievement motivation than by traditional measures of academic performance (Cassidy, 2002).



The third finding showed that the ability to solve citizenship problems does not have an interaction between the difference in major and in student achievement motivation. This means that, simultaneously, students from various majors who are categorised as having high achievement motivation are not different from students from low achievement motivation groups in solving citizenship problems. Strong logical reasons are caused by students having academic self-concepts, achievement goals, and subjective values as a central component of their achievement motivation (Dresel & Grassinger, 2013). The results of similar studies state that achievement motivation does not interact with competence in influencing teacher performance ((Dewi, Bundu, & Tahmir, 2016). These are in line with the results of Badrus's study, (2015) which concluded that achievement motivation and inquiry learning strategies have no effect on problem-solving learning outcomes. Dwiyanto's research (Dwiyanto, 2017) also concludes that there is no interaction between problem-based learning strategies and achievement motivation on learning outcomes of problem-solving abilities.

Conclusion

Based on the results of the research and discussion presented previously, it can be concluded that the differences in backgrounds, namely students majoring in Mathematics, Chemistry, Physics and Engineering, has no effect on the ability to solve citizenship problems. Students who have high achievement motivation have higher citizenship problem-solving abilities compared with students who have low achievement motivation. The interaction between the difference in major, background, and achievement motivation in students does not affect the ability to solve citizenship problems. These findings contribute to the development of literature that has not been found in other studies by providing the aspect of the different majors of students with a Science-Technology background such as Mathematics, Chemistry, Physics and Engineering, related to their ability to solve citizenship problems included in social competence. Contributions are also relevant to civics lecturers for their consideration of problem-solving learning methods. Lecturers also need to know the motivations of student achievement, so that students can be encouraged by collaborative learning in problem-solving tasks. To get better results, further research can attempt to use a larger sample across universities, including all majors in the higher education system in Indonesia. Research can also focus on comparing the ability to solve citizenship problems between students majoring in Science-Technology with students majoring in Social Science.

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