Student's Self-Confidence Change Through the Application of the Guided Discovery Learning Model

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ABSTRACT
This study aims to describe student self-confidence change by applying the Guided Discovery Learning (GDL) model in the solid geometry course. This type of research is quantitative descriptive. The subject of this study was one class of the Mathematics Education Study Program at one university in Yogyakarta, Indonesia. The subject was one clash which randomly selected, consisting of 58 students. The instruments used in this study were self-confidence questionnaires, learning achievement tests, and critical thinking skills tests. All of these instruments were used in pre-test and post-test. The results show that by applying the GDL model in the solid geometry course, the self-confidence of 60.34% of students is increased, 0,34% of self-confidence remained, and 29.32% of self-confidence did not reach the minimum completeness criteria and even tended to decrease. Based on the analysis of the results of learning achievement tests and critical thinking skills on the material about solid geometry, it can be seen that students whose self-confidence increases and remains after the application of GDL are students who have high test scores. Meanwhile, students whose self-confidence decreased after implementing the GDL were students who had low test scores. It shows that the GDL is more suitable for students with moderate or high intelligence and less suitable for students with less intelligence. Self-confidence is identical to the indicator of the growth mindset. So, the level of self-confidence takes part in a person's growth mindset, where the growth mindset affects a person's success at various things in life.

Keywords: *achievement, Critical thinking skills, Guided discovery learning model,Ggrowth mindset, Self-confidence*

1. INTRODUCTION

During the current COVID-19 pandemic, there are many obstacles in carrying out activities, especially in education. Many students in elementary schools, middle schools, and colleges complain about online learning because they are not familiar with it, especially in underdeveloped areas. Whether we realize it or not, online learning can reduce the interaction between teachers and students. As a result, students are forced to learn independently, no longer depending on the direct guidance of the teacher or lecturer.

Students must have good cognitive, psychomotor, and affective skills to learn independently. Providing Guided Discovery Learning (GDL) worksheets can help cognitive and psychomotor students in independent learning, where these worksheets can guide students in independent study as a substitute for lecturer guidance. According to [1], in general, the steps of learning activities in the GDL model are: (1) stimulation (providing stimulation of information); (2) problem statement (problem identification); (3) data collection; (4) data processing; (5) verification (check back); and (6) generalization (making conclusions).

Meanwhile, in the affective domain, students need self-confidence. Students must have confidence in their ability to study or do their work. There are times when a person's lack of self-confidence will hinder him from achieving success, in this case, especially success in self-study.

Several indicators of self-confidence are identical to indicators of the growth mindset. One of them is a person's belief in completing a task, whether it is

completed quickly or must be repeated until it is completed. There are times when a student fails to complete an assignment first and finally gives up. It indicates a manifestation of a lack of self-confidence.

Failure is a predictable outcome on the way to mastery. The possibility of failure is what makes a task worthwhile [2]. The student must raise his confidence with self-awareness or with the help of others to continue the second, third, and so on try until he completes the task. Individuals with a growth mindset believe a person's intellect is malleable and capable of changing over time. Those with a growth mindset make the most of their opportunities and seek challenges. But mindsets are not carved in stone; individuals who recognize the importance of mindsets can change from a fixed to a growth mindset [2]. This unyielding determination to achieve success despite failing many times is an indicator of a growth mindset that everyone needs to have, especially students.

Teacher-students of the mathematics education study program will become mathematics teachers in schools. A mathematics teacher must have good cognitive, psychomotor, and affective competencies to become a professional. The professionalism of a mathematics teacher has a significant role in achieving learning goals and the part of the students themselves [3].

One of the essential affective aspects is self-confidence. Self-confidence is necessary so that a person can carry out his duties well in society [4]. Self-confidence is a person's belief in his abilities without dependence on others, acting according to their wishes, being optimistic about their actions, and being responsible for the consequences of their actions [5]–[7]. A teacher who has high self-confidence will be able to influence his students to be able to have high self-confidence as well.

Meanwhile, in the cognitive aspect, a mathematics teacher must master mathematical concepts well to carry out their duties professionally [8]. Mastery of this concept can be demonstrated by learning achievement. From the opinion of [9-13], learning achievement shows understanding and mastery of the material that a person learns as evidence of his success in learning.

While in the psychomotor aspect, a mathematics teacher needs to have good critical thinking skills to guide students to solve HOTS questions in mathematics. Critical thinking skills are skills in analyzing the truth of a concept, recognizing errors or biases from concept discovery steps, and applying concepts to solve new problems [14-18]. This research is particularly seeking the HOTS model for recent issues in solid geometry.

2. METHOD

This research method is descriptive qualitative. This research approach uses a quantitative approach because it uses numbers, starting from data collection,

interpretation of the data, and the appearance of the results [19]. The problem must be apparent in quantitative research and then formulated to guide research activities [20].

The subject of this study was one class of the Mathematics Education Study Program at one University in Yogyakarta, Indonesia, which was randomly selected, consisting of 58 students. Meanwhile, in this study, the data collection techniques used were Questionnaires and Tests. The questionnaire used is an instrument to measure student self-confidence. The test used is a learning achievement test instrument and a critical thinking skill test on solid geometry material.

All research instruments were used as pretest and posttest. At the beginning of the meeting, students were asked to fill out a self-confidence questionnaire, take a learning achievement test, and take a critical thinking skill test. Furthermore, after implementing the GDL, students are given a posttest whose instrument is equivalent to a pretest. The results of the pretest and posttest are analyzed and then described.

Prior to use, all research instruments were validated by experts in mathematics education and tested on students. The minimum completeness criteria for learning achievement and critical thinking skills are adjusted to the minimum completeness criteria that have been set for bachelor degree students of the Mathematics Education of 65 or B. Meanwhile, the researchers compiled the criteria for self-confidence assessment in this study as follows [21].

Table 1. Confidence assessment criteria

Interval Score	Criteria
$75.6 < X$	Very high
$61.2 < X \leq 75.6$	High
$46.8 < X \leq 61.2$	Enough
$32.4 < X \leq 46.8$	Low
$X \leq 32.4$	Very low

The minimum completeness criteria for the self-confidence variable is high (score 61.2), meaning that all research subjects who have received treatment must at least be included in the criteria for high self-confidence. However, the main objective of this research is not the achievement of minimum completeness of self-confidence, learning achievement, and critical thinking skills, but a description of changes in the level of student self-confidence from before and after the implementation of GDL. In addition, this study also aims to describe the relationship between student self-confidence and the results of learning achievement tests or tests of critical thinking skills.

3. RESULTS AND DISCUSSION

3.1. Results

This research begins with giving pretests to the research subject. They are pretests of self-confidence, learning achievement, and critical thinking skills. Furthermore, the Guided Discovery Learning model is applied to research subjects in solid geometry learning. The observations show that the researchers have succeeded in implementing the GDL well. The application of GDL in learning influences the results of this study. Meanwhile, the pretest and posttest results on the research subjects are as follows.

Table 2. Average student score

Variable (Aspect)	Pretest	Posttest
Self-confidence	60.66	63.19
Learning achievement	47.84	87.12
Critical Thinking Skills	15.34	71.81

Table 2 shows that the application of GDL can increase students' self-confidence, learning achievement, and critical thinking skills in solid geometry courses until they at least reach the predetermined Minimum Completeness Criteria if reviewed using the average value. The study conforms to the results of other studies that also show the effectiveness of problem-based learning in improving higher-order thinking skills and attitudes in the form of self-confidence [22]. Based on theoretical studies, GDL has the characteristics of using problems as a trigger for learning activities.

Previously, explained the research results based on the student's average score, then the research results will be described based on the value of each student. Based on the study results, it can be seen that not all students' self-confidence, learning achievement, and critical thinking skills reached the minimum completeness criteria in the posttest, namely after the application of the GDL.

Table 3. Students whose self-confidence has not reached the minimum completeness criteria

Name	Self-confidence (61.2)		Learning achievement (65)		Critical Thinking Skills (65)	
	Pre	Post	Pre	Post	Pre	Post
S1	48	54	18	47	0	90
S2	58	56	59	88	30	85
S3	49	53	35	100	40	60
S4	52	56	53	100	40	60
S5	62	52	53	88	0	60
S6	53	53	24	71	20	75
S7	56	57	47	100	40	60
S8	55	55	47	88	30	70
S9	63	56	24	76	10	80
S10	51	56	65	88	40	60
S11	57	61	18	88	0	55
S12	56	55	41	76	0	60
S13	60	58	41	71	0	85
S14	50	53	47	88	0	60
S15	58	61	35	82	0	60
S16	51	54	47	82	0	75
S17	55	54	41	88	0	45

From a total of 58 research subjects, there were 17 students (29.32%) whose confidence scores had not reached the minimum completeness criteria of 61.2 and even tended to decrease compared to when the pretest or before the application of the GDL. In addition, there is also 1 student (1.72%) whose learning achievement scores have not reached the minimum completeness criteria of 65. Furthermore, there are 16 (27.59%) students whose critical thinking skills have not reached the minimum completeness criteria of 65. It can be seen that what is still problematic is the students' self-confidence and necessary thinking skills.

The following analysis is directed to the relationship between students' self-confidence and critical thinking skills. In Table 3, from 17 students whose confidence has not reached the minimum completeness criteria, there are ten students whose essential skills of thinking also have not reached the minimum completeness criteria (S3, S4, S5, S7, S10, S11, S12, S14, S15, and S17). Meanwhile, seven other students whose confidence has not reached the minimum completeness criteria have achieved the minimum completeness criteria for their critical thinking skills. It means that 58.82% of students who lack self-confidence lack critical thinking skills.

Table 3 also shows that one student, namely S1 (5.88%), whose self-confidence has not reached the minimum completeness criteria. The value of learning achievement has also not reached the minimum completeness criteria. So that it can be concluded that there are a total of 11 students (64.7%) of the 17 students whose confidence has not yet reached the minimum completeness criteria; in fact, they also have deficiencies in learning achievement or critical thinking skills. The 11 students are S1, S3, S4, S5, S7, S10, S11, S12, S14, S15, and S17. In Table 3, it can be seen that of the 11 students whose self-confidence decreased after implementing the GDL were six students, namely S2, S5, S9, S12, S13, and S17.

Based on theoretical studies, learning achievement test results reflect a person's cognitive level, and critical thinking skills test results reflect a person's psychomotor level; in this case, they are skilled in thinking in the realm of mathematics. The results of this study indicated that 64.7% of students who lacked self-confidence were students who also had deficiencies in the cognitive and psychomotor domains.

3.2. Discussion

The application of GDL in learning influenced the results of this study; it indicated that the application of GDL was felt to be less suitable for students whose cognitive and psychomotor abilities were lacking or low because they tended to lower the students' self-confidence.

By applying the GDL model in the solid geometry course, there were 35 students (60.34 %) whose self-confidence increased and six students (10.34 %) whose self-confidence remained. It means that 41 students (70.68%) self-confidence reaches the minimum completeness criteria and even tends to increase after the application of GDL from the total of 58 students. Based on the analysis of the 41 students' data, it can be seen that all of them have high learning achievement test scores and critical thinking skills tests and achieve minimum completeness criteria. It shows that the application of GDL is very suitable for students with high cognitive and psychomotor abilities because they tend to increase the students' self-confidence.

From a total of 58 students, there were 17 students whose self-confidence decreased after the GDL treatment, and they were among those with low test scores. It follows the statement that self-confidence is a good predictor of academic achievement when students do not experience difficulties [23].

Several indicators of self-confidence are identical to indicators of the growth mindset. Dweck states that the growth mindset believes that intelligence can develop through any effort that can be learned [2]. The higher a person's self-confidence, the higher the growth mindset that is expected to support success, especially the growth mindset of students in learning. The growth mindset believes that one's skills and qualities can be developed through effort, good strategy, and support from others. A person with a growth mindset can accept challenges. A person with a growth mindset can learn from failure to get more significant results [24].

4. CONCLUSION

The results of data analysis show that the proportion of students whose learning achievement reaches 70 is more than 70%. The ratio of students with problem-solving skills in the "good" category is more than 70%, and the proportion of students who have self-confidence in the "good" category is more than 75%. Based on the analysis results, it can be concluded that problem-based learning is effective in learning achievement, problem-solving ability, and self-confidence.

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REFERENCES

[1] M. Syah, Psikologi pendidikan dengan pendekatan baru. Bandung: PT Remaja Rosda Karya, 2014.

[2] C. Dweck, Mindset-the new psychology of success. New York: Random House, 2006.

[3] O. R. Imawan and R. Ismail, Meningkatkan kompetensi guru matematika dalam mengembangkan media pembelajaran 4.0 melalui pelatihan aplikasi geogebra, J. Masy. Mandiri, vol. 4, no. 6, pp. 1231–1239, 2020, [Online]. Available: https://journal.ummat.ac.id/index.php/jmm/article/view/3102.

[4] A. Tan, Creativity. Singapore: World Scientific, 2007.

[5] S. L. McElmeel, Character education. Colorado: Greenwood Publishing Group, Inc., 2002.

[6] S. McPheat, Personal confidence & motivation. UK: MTD Training & Ventus Publishing, 2010.

[7] M. & S. R. R. Ghufron, Teori-teori psikologi. Yogyakarta: Ar-ruzz Media, 2010.

[8] R. Ismail and O. R. Imawan, Meningkatkan penguasaan TPACK guru di papua melalui pelatihan pembuatan video pembelajaran pada masa pandemi covid-19, J. Masy. Mandiri, vol. 5, no. 1, 2021, [Online]. Available: https://journal.ummat.ac.id/index.php/jmm/article/view/3862.

[9] H. Hudojo, Mengajar belajar matematika. Jakarta: Departemen Pendidikan dan Kebudayaan, 1988.

[10] W. S. Winkel, Psikologi pembelajaran. Jakarta: PT Grasindo, 1996.

[11] H. Boyd, D., & Bee, Lifespan development fifth edition. New York: Routladge Taylor and Francis Group, 2009.

[12] N. Sudjana, Penilaian hasil proses belajar mengajar. Bandung: PT Remaja Rosdakarya, 1992.

[13] A. Nitko and S. Brookhart, Educational assessment of student (6th ed). Boston: Pearson Education, 2011.

[14] E. Glazer, Using internet primary sources to teach critical thinking skills in mathematics. Westpost: Greenwood Press, 2001.

[15] C. Epstein, R. L., & Kernberger, Critical thinking. Toronto: Thomson Wadsworth, 2006.

[16] L. Gambrill, E., & Gibbs, Critical thinking for healping professional. Oxford: Oxford University Press, 2009.

[17] A. Arends, R. I., & Kilcher, Teaching for student learning. New York: Routladge Taylor and Francis Group, 2010.

[18] L. B. Starkey, Critical thinking skills success in 20 minutes a day 2nd edition. New York: LearningExpress, 2010.

[19] S. Arikunto, Prosedur penelitian: suatu pendekatan penelitian. Jakarta: Rineka Cipta, 2005.

[20] Sugiyono, Metode penelitian kuantitatif, kualitatif, dan R&D. Bandung: Alfabeta, 2019.

[21] E. P. Widoyoko, Evaluasi Program Pembelajaran:Panduan Praktis bagi Pendidik dan Calon Pendidik. Yogyakarta: Pustaka Pelajar, 2013.

[22] R. Ismail, Perbandingan keefektifan pembelajaran berbasis proyek dan pembelajaran berbasis masalah ditinjau dari ketercapaian tujuan pembelajaran, Pythagoras, vol. 13, no. 2, 2018, [Online]. Available: https://journal.uny.ac.id/index.php/pythagoras/article/view/23595.

[23] C. S. Dweck, Self theories. Tangerang Selatan: BACA, 2021.

[24] PISA, Sky's the limit: growth mindset, student, and schools in PISA. OECD Publishing, 2018.