UJMER 10 (2) (2021) 195 - 201

Unnes Journal of Mathematics Education Research

http://journal.unnes.ac.id/sju/index.php/ujmer

Analysis of Mathematical Communication Ability in terms of Self Confidence in Schoology Assisted Treffinger Learning

Haifa Nafisah ✉, Isnarto Isnanrto, Wardono Wardono

Pascasarjana Universitas Negeri Semarang, Indonesia

Article Info

Article History:
Received :
21 June 2021
Accepted:
28 August 2021
Published:
30 December 2021

Keywords:
Communication Ability, Self-Confidence, Treffinger, Schoology

Abstract

Mathematical communication ability needs to be possessed by students because it is an essential ability recommended by NCTM. This research aims to describe students' mathematical communication ability in terms of self-confidence in Treffinger learning assisted by Schoology. This type of research is a descriptive study with a qualitative approach. The subjects in this study were students of class X AKL 2 in the 2020/2021 academic year which consisted of 12 students. The taking of research subjects in this study was determined through the purposive sampling technique. The results showed that the achievement of students' mathematical communication ability in terms of self-confidence in Schoology assisted Treffinger learning was very diverse. Mathematical communication ability in terms of self-confidence shows that students with high self-confidence can understand and master the three indicators, students with moderate self-confidence do not master one indicator, while students with low self-confidence have not yet understood and mastered the three indicators.

✉Correspondence:
Jl. Kelud Utara III Semarang 50237 Jawa Tengah, Indonesia
E-mail: haifanafisah@students.unnes.ac.id

p-ISSN 2252-6455
e-ISSN 2502-4507

INTRODUCTION

Mathematics learning is not only oriented towards the ability of students to solve math problems but is further oriented in the ability of students to solve everyday problems. Mathematical communication ability is one of the goals formulated by the National Council of Teachers of Mathematics (NCTM, 2000). This ability is one of the basic mathematical abilities that are essential and need to be possessed by every middle student. One of the things that makes the importance of mathematical communication for students is because mathematical communication is an estuary for students in determining mathematical concepts and ways of solving mathematics (Aini, Hartawan, & Astawa, 2019).

Through communication, students can organize and consolidate their mathematical thinking (Hendriana, Rohaeti, & Sumarmo, 2017). However, the results of the PISA study show that the position of Indonesian students in their mathematical abilities is still at the lowest rank. Research result Niasih, Romlah, and Zhanty (2019) also stated that the students' mathematical communication ability was still low.

Rakim, Wilonoyudho, and Widjanarko (2017) stated that apart from hard ability, the soft ability is also in the spotlight in the world of education and industrial needs. The dominant need to determine success is not technical ability or hard ability but self-quality in the soft ability category. One of the soft abilities that still needs to be developed is self-confidence. Results from The Trends in International Mathematics and Science Study (TIMSS, 2015) that student confidence in Indonesia is still low below 30%. The low self-confidence of students results in low abilities (Delina, Afrilianto, & Rohaeti, 2018).

According to Agustyaningrum and Suryantini (2016), learning habits and self-confidence are thought to be factors that are strong enough to influence learning outcomes. Learning with self-confidence can make learning activities because students dare to express new ideas (Rahmadhani, 2018). Self-confidence is the key to success, because having high self-confidence can motivate to improve their abilities and achievements in learning. This is compatible with the opinion of Hendriana, Slamet, and Sumarmo (2014) that someone who has high or strong self-confidence will be motivated to achieve success. Regarding optimizing students' mathematical communication ability according to LaForce, Noble, and Blackwell (2017), that self-confidence is an important factor, so the hope is that all students can increase their self-confidence.

There needs to be a learning innovation carried out by the teacher so that it can help students optimize students' mathematical communication ability and foster high self-confidence in students. One of the learning models referred to is the Treffinger learning model. The Treffinger learning model was introduced by Donald J. Treffinger in 1980 (Annuuru, Johan, & Ali, 2017). This learning model has three components that are understanding challenges, generating ideas, and preparing for action which is then detailed into six stages that are determining goals, extracting data, formulating problems, generating ideas, developing solutions, and building acceptance (Huda, 2017).

According to Treffinger, Isaksen, and Dorval (2010) the Treffinger learning model is used to help solve problems and manage change creatively. This learning model is one of the learning models that will train students to express their ideas because in its stages there is a syntax of generating ideas (Ulya & Rahayu, 2017). This aims to make students accustomed to conveying their ideas and opinions in mathematics learning so that it can improve students' mathematical communication ability and foster self-confidence in students. This is compatible with research by Alhaddad, Kusumah, Sabandar, and Dahlan (2015) that the Treffinger learning model makes a positive contribution to improving students' mathematical communication skills.

The Treffinger learning model can also organize students 'efforts in solving problems so that students' thinking patterns become more systematic (Juliantari, Suharta, & Suarsana, 2018). The characteristics of the Treffinger learning model are integrating the cognitive and affective dimensions of students to find directions for solving problems, as well as making students active participants in problem solving.

Currently especially during the Covid-19 pandemic one of the lessons that are popular in the era of the industrial revolution 4.0 is e-learning. In the

United States, e-learning is used by nearly 90% at every level of education unit that has more than 10,000 students (Basori in Nolaputra, Wardono, & Supriyono, 2018). This e-learning learning is developing rapidly, starting from just a PowerPoint in class until now to a Learning Management System (LMS). LMS is a software application or web-based technology that is used to plan, implement, and assess certain learning processes (Sicat, 2015). One of the popular LMS learning media today in the field of online learning is Schoology.

Schoology is a web-based educational application that allows teachers to provide lessons to students digitally and for free. Based on its capabilities, this media can combine social networking features and LMS (Haryanto, 2018). Schoology is very suitable as a learning medium in e-learning (Choirudin, 2017). This application is very easy to use and fun because it is like the social media Facebook. According to Rohman (2017), this application has several advantages, namely as a very complete editor and file management similar to Windows Explorer. Schoology implements an LMS that allows teachers to provide teaching materials, organize the learning process, and evaluate the learning process (Irawan, Sutadji, & Widiyanti, 2017).

The purpose of this study was to describe students' mathematical communication ability in terms of self-confidence in Schoology assisted Treffinger learning.

METHOD

This research was conducted at SMK Swadaya Temanggung. This type of research is a descriptive study with a qualitative approach. The sample in this study were students of class X AKL 2 in the 2020/2021 academic year which consisted of 36 students. The taking of research subjects in this study was determined through the purposive sampling technique. The determination of the research subjects was based on the results of tests of mathematical communication ability and a self-confidence questionnaire assessment. The criteria for selecting the subject of this study can be seen in Table 1.

Table 1. Criteria for Selection of Research Subjects

Interval	Category
$x < \bar{x} - s$	Low
$\bar{x} - s \leq x \leq \bar{x} + s$	Moderate
$x > \bar{x} + s$	High

Information:

$\bar{x}$: ideal average $= \frac{1}{2} \times$ (highest score + lowest score)

s : standard deviation $= \frac{1}{6} \times$(highest value - lowest value)

The data in this study were collected directly by researchers with the help of Schoology and research instruments. The instruments used in this study were the Mathematical Communication Ability Test (TKKM) questions, self-confidence questionnaires, interview guides, and field notes that were used to record important things that were not recorded on other instruments, as well as documentation in the form of photographs.

Data analysis before starting the study was carried out by validating the research tools and instruments. Data analysis in this study was taken from the results of self-confidence questionnaires and tests of mathematical communication ability and the results of interviews. Analysis data is done by reducing data, presenting data, and verifying or drawing conclusions.

RESULTS AND DISCUSSIONS

After the data is collected, the next step is to analyze the data. In this data analysis, the use of a questionnaire is intended to see whether the beliefs that students have been included in the high, medium, and low categories. The categories of the results of the self-confidence questionnaire can be seen in Table 2.

Table 2. Categories of Self Confidence Questionnaire Results

Interval	Category
$x < 110$	Low
$110 \leq x \leq 128$	Moderate
$x > 128$	High

The percentage of the results of the self-confidence questionnaire can be seen in Table 3.

Table 3.1 Percentage of Student Confidence Questionnaire Results

Self Confidence Category	Total students	Percentage
High	5	14%
Moderate	20	55.5%
Low	11	30.5%
amount	36	100%

Table 3. shows that students who fall into the high category of self-confidence are only 14% or 5 out of 36 students. Students who fall into the moderate category of self-confidence are as much as 55.5% or 20 of 36 students. Furthermore, students who are included in the low category of self-confidence are 30.5% or 11 of 36 students.

In this study, students' mathematical communication ability was based on three indicators according to Nugraha and Pujiastuti (2019). These indicators include (1) expressing a situation or mathematical idea in the form of a picture and completing it (drawing); (2) expressing a situation or mathematical idea in the form of a mathematical symbol or model and solving it (a mathematical expression); and (3) expressing and explaining a mathematical image or model in the form of written texts.

The results of the students' mathematical communication ability test are also divided into three categories, namely upper, middle, and lower. The categories of the results of the self-confidence questionnaire can be seen in Table 4.

Table 4. Categories of Mathematical Communication Ability Test Results

Interval	Category
$x < 57$	Low
$57 \leq x \leq 75$	Moderate
$x > 75$	High

The percentage of communication ability test results can be seen in Table 5.

Table 5.2 Percentage of Mathematical Communication Ability Test Results

TKKM Result Category	Total students	Percentage
On	7	19.5%
Middle	13	36%
Under	16	44.5%
amount	36	100%

Table 5. shows that students who are included in the upper category TKKM are only 19.5% or 7 out of 36 students. Students included in the middle category TKKM were 36% or 13 of 36 students. Furthermore, students included in the lower category of TKKM were 44.5% or 16 out of 36 students.

Based on Table 3 and Table 5, the recapitulation of grouping the results of the self-confidence questionnaire and the results of the TKKM can be seen in Table 6.

Table 6.3 Recapitulation of Grouping of Confidence Questionnaire Results and TKKM Results

Confidence	TKKM		
	On	Middle	Under
High	3	2	0
Moderate	4	7	9
Low	0	4	7

Based on Table 6., 12 students were selected as research subjects. The attainment of each subject varies greatly. The results of TKKM showed that subjects with the upper category of TKKM were able to understand and master the three indicators. Subjects with TKKM in the middle category can understand and master one or two indicators. Subjects with lower category TKKM are only able to understand and master a maximum of one indicator.

The achievement of the subject based on high self-confidence with the results of the TKKM in the top category shows that the subject can understand and master the three indicators (mathematical expression, drawing, and written texts) well. The achievement of the subject based on high self-confidence with the results of TKKM in the middle category shows that the subject can understand and master two indicators (mathematical expression and drawing) well and is lacking in indicators of written

texts. Achievements of subjects based on high self-esteem with lower category TKKM results were not found. This shows that with high self-confidence students can achieve upper or middle category TKKM results.

The achievement of the subject based on moderate self-confidence with the TKKM results in the top category shows that the subject can understand and master the three indicators (mathematical expression, drawing, and written texts) well. The achievement of the subject based on moderate self-confidence with the results of the TKKM in the middle category shows that the subject can understand and master two indicators (drawing and written texts) well and is lacking in mathematical expression indicators. The achievement of the subject based on moderate self-confidence with the results of the TKKM in the lower category shows that the subject is less able to master mathematical expression indicators and does not understand and master two indicators (drawing and written texts). This shows that with moderate self-confidence students can achieve TKKM results in the upper, middle, and middle categories.

Achievement of subjects based on low self-confidence with the results of TKKM in the upper category was not found. The achievement of the subject based on low self-esteem with the results of TKKM in the middle category shows that the subject can understand and master drawing indicators well and lacks two indicators (mathematical expression and written texts). The achievement of the subject based on moderate self-confidence with the TKKM results in the lower category shows that the subject has not been able to understand and master the three indicators (mathematical expression, drawing, and written texts). This shows that with moderate self-confidence students can reach the middle or lower category TKKM.

The description shows that Students with high self-confidence can achieve upper and middle category mathematical communication ability. Students with moderate self-confidence can achieve upper, middle, and lower categories of mathematical communication ability. Furthermore, students with low self-confidence can achieve middle and lower categories of mathematical communication ability. There were no students who achieved communication ability in the lower category with high self-confidence and on the contrary, there were no students who reached the upper category communication ability with low self-confidence.

This is in line with research conducted by Rizqi, Suyitno, & Sudarmin (2016) that students who have high or moderate self-confidence, their mathematical communication ability are classified as good. Research results from Sham (2017) also state that individuals who have high self-confidence will get good achievements because they always think positively and believe in their abilities. Conversely, individuals who have low self-confidence will have unsatisfactory learning achievements because they always think negatively and do not believe in their abilities.

CONCLUSION

Based on the analysis and discussion, it is concluded that the achievement of students' mathematical communication ability in terms of self-confidence in Schoology assisted Treffinger learning is very diverse. The results of TKKM showed that subjects with the upper category of TKKM were able to understand and master the three indicators. Subjects with TKKM in the middle category can understand and master one or two indicators. Subjects with lower category TKKM are only able to understand and master a maximum of one indicator. There were no students who achieved communication ability in the lower category with a high category of self-confidence and conversely, there were no students who reached the upper category communication ability with low self-confidence.

REFERENCES

Aini, Q., Hartawan, I. G. N. Y., & Astawa, I. W. P. (2019). Pengaruh Model Pembelajaran Treffinger Terhadap Kemampuan Komunikasi Matematis Siswa Kelas X MIA SMA Negeri 1 Sukasada. Jurnal Pendidikan Matematika Undiksha, 10(1), 29–37.

Alhaddad, I., Kusumah, Y. S., Sabandar, J., & Dahlan, J. A. (2015). Enhancing Students' Communication Skills Through Treffinger

Teaching Model. Journal on Mathematics Education, 6(1), 31–39.

Annuuru, T. A., Johan, R. C., & Ali, M. (2017). Peningkatan Kemampuan Berpikir Tingkat Tinggi dalam Pelajaran Ilmu Pengetahuan Alam Peserta Didik Sekolah Dasar Melalui Model Pembelajaran Treffinger. Jurnal Edutcehnologia, 3(2), 136–144.

Choirudin. (2017). Efektivitas Pembelajaran Berbasis Schoology. NUMERICAL: Jurnal Matematika Dan Pendidikan Matematika, 1(2), 52–62.

Delina, Afrilianto, M. &, & Rohaeti, E. E. (2018). Kemampuan Berpikir Kritis Matematis dan Self Confidence Siswa SMP Melalui Pendekatan Realistic Mathematic Education. Jurnal Pembelajaran Matematika Inovatif, 1(3), 281–288.

Haryanto, S. (2018). Kelebihan dan Kekurangan E-Learning Berbasis Schoology (Studi PTK dalam Pembelajaran Mata Kuliah Academic Listening). Prosiding Seminar Nasional GEOTIK, 106–110.

Hendriana, H., Rohaeti, E. E., & Sumarmo, U. (2017). Hards Skills dan Soft Skills Matematik Siswa. Bandung: Refika Aditama.

Hendriana, H., Slamet, U. R., & Sumarmo, U. (2014). Mathematical Connection Ability and Self-Confidence (An experiment on Junior High School students through Contextual Teaching and learning with Mathematical Manipulative). International Journal of Education, 8(1), 1–11.

Huda, M. (2017). Model-Model Pengajaran dan Pembelajaran (VII). Yogyakarta: Pustaka Pelajar.

Irawan, V. T., Sutadji, E., & Widiyanti. (2017). Blended Learning Based on Schoology: Effort of Improvement Learning Outcome and Practicum Chance in Vocational High School. Cogent Education, 4(1), 1–10.

Juliantari, N. P., Suharta, I. G. P., & Suarsana, I. M. (2018). Peningkatan Kemampuan Pemecahan Masalah Matematika Siswa Kelas VII pada Materi Bilangan melalui Model Treffinger Berbantuan Masalah Open- Ended. BRILIANT: Jurnal Riset Dan Konseptual, 3(4), 425–435.

LaForce, M., Noble, E., & Blackwell, C. (2017). Problem-Based Learning (PBL) and Student Interest in STEM Careers: The Roles of Motivation and Ability Beliefs. Education Sciences, 7(92), 1–22.

NCTM. (2000). Principles and Standards for School Mathematics. https://doi.org/10.1016/s0737-0806(98)80482-6

Niasih, Romlah, S., & Zhanty, L. S. (2019). Analisis Kemampuan Komunikasi Matematis Siswa SMP di Kota Cimahi pada Materi Statistika. Journal Cendekia: Jurnal Pendidikan Matematika, 3(2), 266–277.

Nolaputra, A. P., Wardono, & Supriyono. (2018). Analisi Kemampuan Literasi Matematika pada Pembelajaran PBL Pendekatan RME Berbantuan Schoology Siswa SMP. Prosiding Seminar Nasional Matematika, 1, 18–32.

Nugraha, T. H., & Pujiastuti, H. (2019). Analisis Kemampuan Komunikasi Matematis Siswa Berdasarkan Perbedaan Gender. Edumatica: Jurnal Pendidikan Matematika, 9(1), 1–7.

Rahmadhani, E. (2018). Model Pembelajaran Process Oriented Guided Inquiry Learning (POGIL): Peningkatan Disposisi Matematika dan Self-Confidence Mahasiswa Tadris Matematika. Jurnal Riset Pendidikan Matematika, 5(2), 159–167.

Rakim, R., Wilonoyudho, S., & Widjanarko, D. (2017). Penerapan Model Pembelajaran Shesil (Soft, Hard and Environment Skill Integrated Learning) pada Kecakapan Otomotif. Journal of Vocational and Career Education, 2(2), 41–49.

Rizqi, A. A., Suyitno, H., & Artikel, I. (2016). Analisis Kemampuan Komunikasi Matematis Ditinjau Dari Kepercayaan Diri Siswa Melalui Blended Learning. Unnes Journal of Mathematics Education Research, 5(1), 17–23.

Rohman, M. F. (2017). Learning Management System SCHOOLOGY. Bojonegoro: Pustaka Intermedia.

Sicat, A. S. (2015). Enhancing College Students' Proficiency in Business Writing Via Schoology. International Journal of Education and Research, 3(1), 159–178.

Syam, A., & Amri. (2017). Pengaruh Kepercayaan Diri (Self Confidence) Berbasis Kaderisasi

IMM Terhadap Prestasi Belajar Mahasiswa (Studi Kasus di Program Studi Pendidikan Biologi Fakultas Keguruan Dan Ilmu Pendidikan Universitas Muhammadiyah Parepare). Jurnal Biotek, 5(1), 87–102.

TIMSS. (2015). Highlights from TIMSS and TIMSS Advanced 2015: Mathematics and science achievement of U.S. students in grades 4 and 8 and in Advanced Courses at The End of High School in An International Context. (NCES 2017-002). National Center for Education Statistics. Retrieved from https://eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=ED570893

Treffinger, D. J., Isaksen, S. G., & Dorval, K. B. (2010). Creative Problem Solving (CPS Version 6. 1 TM) A Contemporary Framework for Managing Change Creative Problem Solving (CPS)—.

Ulya, H., & Rahayu, R. (2017). Pembelajaran Treffinger Berbantuan Permainan Tradisional Congklak untuk Meningkatkan Kemampuan Komunikasi Matematis. AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 6(1), 48–55.