

Proceedings

The 5th Annual INTERNATIONAL SEMINAR on Transformative Education and Educational Leadership

Theme : Education Innovation in Globalization Practice

22 September 2020
Postgraduate School - Universitas Negeri Medan



Supported by :



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Schedule of The 5th Annual Internatioanal Seminar on Transformative Education and Educational Leadership (AISTEEL) 2020
Postgraduate School, Universitas Negeri Medan

22 September 2020

(Indonesian time)	Activities	PIC/Moderator
07.00 – 08.30 (am)	Preliminaries	committee
08.30 - 08.45 (am)	Opening Ceremony 1. MC Speech 2. Indonesian National Anthem 3. Pray 4. Chairperson Report 5. Welcoming speech of Director of Postgraduate School 6. Welcoming speech and official opening of Rector of Universitas Negeri Medan 7. Photo session	MC (Dr. Anni Holila Pulungan, M.Hum & Sofianto Gultom, S.Pd)
08.45 – 09.25 (am)	Keynote Speech 1: Prof. Dr. Syawal Gultom, M.Pd (Universitas Negeri Medan– Indonesia)	Dr. Rahmad Husein, M.Ed
09.25 – 10.05 (am)	Keynote Speech 2 Prof. Emmanuel Manalo (Graduate School of Education, Kyoto University, Japan)	Prof. Amrin Saragih, PhD
10.05 – 10.45 (am)	Keynote Speech 3 Dr. Susan Ledger (Head of Education, Murdoch University - Australia)	
10.45 – 11.25 (am)	Keynote Speech 4 Prof. Dr. Ekkarin Sungtong (Dean of Faculty of Education Prince of Songkla University - Thailand)	Mangara Simanjorang, PhD
11.25 – 12.05 (am)	Keynote Speech 5 Assoc. Prof. Yuri Uesaka (The University of Tokyo - Japan)	
12.05 – 13.30	Break	
13.30 – 15.30 (pm)	Parallel Session 1 (divided to 19 parallel rooms)	Moderator/Operator
15.30 – 15.35 (pm)	Break	
15.35 – 17.00 (pm)	Parallel Session 2 (divide to 19 parallel rooms)	Moderator/Operator
17.00 – 17.10 (pm)	Cloosing	committee

**Proceedings of the 5th Annual International Seminar on Transformative Education
and Educational Leadership (AISTEEL 2020)**

Preface

The fifth Annual International Seminar on Transformative Education and Educational Leadership (AISTEEL 2020) was held by virtual seminar on 22 September 2020. This seminar is organized by Postgraduate School, Universitas Negeri Medan and become a routine agenda at Postgraduate program of Unimed now.

The AISTEEL is realized this year with various presenters, lecturers, researchers and students from universities both in and out of Indonesia participating in, the seminar with theme “Educational Innovation in Globalization Practice”.

The fifth AISTEEL presents 4 distinguished keynote speakers from Universitas Negeri Medan - Indonesia, Kyoto University - Japan, Murdoch University – Australia, Prince of Songkla University – Thailand and from The University of Tokyo - Japan. In addition, presenters of parallel sessions come from various Government and Private Universities, Institutions, Academy, and Schools. Some of them are those who have sat and will sit in the oral defence examination. The plenary speakers have been present topics covering multi disciplines. They have contributed many inspiring inputs on current trending educational research topics all over the world. The expectation is that all potential lecturers and students have shared their research findings for improving their teaching process and quality, and leadership.

There are 180 articles submitted to committee, some of which are presented orally in parallel sessions, and others are presented through posters. The articles have been reviewed by double blind reviewer and 104 of them were accepted for published by Atlantis Press indexed by International Indexation, while 54 papers are published by digital library indexed by google scholar..

The Committees of AISTEEL invest great efforts in reviewing the papers submitted to the conference and organizing the sessions to enable the participants to gain maximum benefit.

Grateful thanks to all of members of The 5th Annual International Seminar on Transformative Education and Educational Leadership (AISTEEL 2020) for their outstanding contributions. Thanks also given to Atlantis Press for producing this volume.

The Editors

**Bornok Sinaga
Rahmad Husein
Juniastel Rajagukguk**

Table of Content

Title And Authors	Page
The Effect of Learning Models and Motion Ability on Learning Outcomes of Volleyball Passing Skills for Class VIII Students of Junior High School 6, Academic Year 2019-2020 <i>Ihsan Azhari Hasugian; Julaga Situmorang; Abdul Hasan Saragih</i>	1-5
The Effect of Everyone is a Teacher Here Learning Model and Learning Style on The Economic Learning Outcomes <i>Swara Kasih Kartini Putri; Saidun Hutasuhut; M. Nasir</i>	6-10
The Effect of Learning and Creativity Models on the Economic Learning Outcomes of Grade XI Berastagi High School Students <i>Wisnu Saputra Sembiring</i>	11-16
The Effect of Learning Methods and Courage Towards The Outcomes of Learning Physical Education Students Class V Public Elementary School in Sub-District Tanah Jawa <i>Dewi Hamda M. Sirait; Albadi Sinulingga; Agung Sunarno</i>	17-22
Development of Exercise Variations Race After Lay Up Basketball <i>M.Anas Surimeirian; Tarsyad Nugraha; Rahma Dewi</i>	23-25
Development of Dribble Training Variations in The Basketball Extracurricular Club in State High Schools of Medan City 2020 <i>Riski Iman Siregar; Ardi Nusri; Agung Sunarno</i>	26-29
Development of Interactive Learning Media Basketball Games in Subjects Physical and Sports Health Education <i>Andes Martua Harahap; Imran Akhmad; Hariadi</i>	30-37
Speech Function in The News Broadcast of the Radio Kardopa Medan <i>Syukur Selamat Gulo; Amrin Saragih ; Sumarsih</i>	38-44
External and Internal Conjunctions in the News Story Text of the Jakarta Post <i>Novita Sari; Amrin Saragih; Anni Holila Pulungan</i>	45-49
Analysis of Chemical Practicum Guides for Learning Evaluation Based on the National Education Standards <i>Arfiena Fitria Berutu; Iis Siti Jahro; Marham Sitorus</i>	50-53
An Analysis of Students' Scientific Attitude on the Topic of Bryophytes in State High Schools of the Langkat Regency <i>Muhammad Syukri; Ashar Hasairin; Fauziyah Harahap</i>	54-57
Karonese Language Shift of Young Generation <i>Tita Nirmaliya Ginting ;Siti Aisyah Ginting; Anni Holila Pulungan</i>	58-62
Interruption in the Conversation on Corbuzier Youtube	63-66

<i>Devi Rahmawiyta Sitompul; Sri Minda Murni; Anni Holila Pulungan</i>	
Analysis of the Determinan of North Sumatra Cofffe Exports to the United States Error Correctional Model Approach <i>Rimelda Rona Sar; M. Nasir; Muhammad Fitri</i>	67-70
The Implementation of Deception Strategy Used by Fahri Hamzah as an Indonesian People’s Representative Council in the Political Debate <i>Astari Rara Sandy; Sumarsih; Meisuri</i>	71-73
The Flouting Maxim in Social Interaction Expressed by The Characters in Zakeut Edition of Eumpang Breuh Movie <i>Asmaul Husna; Sumarsih; I Wayan Dirgeyasa</i>	74-77
How Children Acquire Lexical Acquisition <i>Dwi Astarini</i>	78-81
Translation Method in Web-Toon: True Beauty as Digital Comic by Yaongyi <i>Fitri Anisah Sitorus; Rahmad Husein; Sri Minda Murni</i>	82-86
Naturalization in Translation of English Accounting Terms into Indonesian <i>Anita Basrah; Anni Holila Pulungan; Rahmad Husein</i>	87-90
Types of Rudeness in the Classroom Context <i>Siti Sahuri; Sri Minda Murni; Rahmad Husein</i>	91-95
The Influence of Agriculture and Industry Sectorson GRPDin Serdang Bedagai Regency <i>Zuhari; M. Fitri Rahmadana; Arwansyah</i>	96-100
Analysis of Input Production of Rice <i>Hazlansyah Ramelan; Arwansyah; Rachmat Mulyana</i>	101-104
The Effect of Functional Training and Balanced Nutrition on Increasing Vo2max and Reduction of Percent Body Fat in Women Members of New Life Gym <i>Fery Juanda; Hariadi; Ardi Nusri</i>	105-107
The Translation of Cultural Words in Novel the Associate <i>Farah Frayenisari Sutara; Anni Holila Pulungan; Syahron Lubis</i>	108-112
Analysis of the Effect of Macroeconomic Variables to Joint Stock Price Index with Monetary Policy as Moderating Variables in Indonesia <i>A. Mahendra; Dede Ruslan; Sirojuzilam; Irsad</i>	113-118
Students’ Multilanguages Acquisition <i>Wikiaprian Pinim; Rahmad Husein; Siti Aisyah Ginting</i>	119-126
Pastap Game Development for Learning Badminton of the Mild Mental Retardation <i>Mulia Romadi Harahap; Sanusi Hasibuan; Isa Hidayati; Hariadi; Friska Indria Nora Harahap</i>	127-130

Types of Elicitation on Students' Engagement in Learning English <i>Wilda Novri Anisah; Rahmad Husein; Masitowarni Siregar</i>	131-133
Flouting Maxim of Humor in Digidoy Comic Strips <i>Yanti Hidayani Hasibuan; T. Silvana Sinar; Rahmad Husein</i>	134-136
Improvement of Mathematical Communication Skills and Student Learning Motivation Through Realistic Mathematics Education Approaches <i>Sari Arta Simanjuntak, Waminton Rajagukguk, Yulita Molliq Rangkuti</i>	137-140
Taboo Words in Rap Song Lyrics <i>Nurul Khoiriyah Hasibuan; Amrin Saragih; Rahmad Husein</i>	141-143
The Technique of Montessori Method to Investigate Reading Achievement at Preschool <i>Sofiah Rahmah Nst; Rahmad Husein; Masitowarni Siregar</i>	144-146
Analysis of Academic Supervision of Principal to Improve Teachers' Basic Teaching Skills at SMK Swasta Harapan Mekar 2 Medan <i>Fahmi, Prof. Dr. Zainuddin, M.Pd, Dr. Irwandy, M.Pd</i>	147-150
Ritual Ngumbah Keris in Javanese Society (Study on the Javanese community in the Kuala Silo Bestari sub-district, North Tanjungbalai district, Tanjungbalai City) <i>Syuhady Witana; Ichwan Azhari; Pujiati Chalid</i>	151-153
The Effect of Literature Circle and Students' Interest on Students' Reading Comprehension Achievement <i>Siti Soleha; Rahmad Husein; Zainuddin</i>	154-158
The Development of Game Based on Basic Motion Learning Model in SD Brigjend Katamso Medan <i>Iswanta Ginting, Haradi, Sanusi Hasibuan</i>	159-162
Types of Intertextuality in Opposite Editorials Related to the Vice Presidential Candidates Debate Topics 2019 <i>Elsi Revita Hasibuan; Anni Holila Pulungan; Sri Minda Murni</i>	163-168
Lexical Metaphor Used in Awaken the Giant Within for Transforming Lives of Students <i>Henri Dunant Biha; Rahmad Husein; Anni Hollila Pulungan</i>	169-171
Analysis of Factors Affecting Rice Imports in North Sumatera <i>Adiguna Dwirusandi; Dr. Arwansyah, M.Si.; Dr. Fitrawaty, M.Si.</i>	172-175
Types and Functions of Fillers Used by Indonesian Celebrities in Seleb English Youtube Videos <i>Ella Marissa Pardede; Amrin Saragih; Anni Holila Pulungan</i>	176-180
Analysis of Labor Demand and Supply in North Sumatra <i>Muhammad Alhasymi Matondang; Dede Ruslan; Indra Maipita</i>	181-185

Culturally Loaded Words and Phrases in Nevermoor Translated into Bahasa Indonesia <i>Noni Indani</i>	186-189
The Effect of Word Wall Strategy and Students' Interest on English Vocabulary Mastery <i>Siti Fadhilah Siregar; Anni Holila Pulungan; Sri Minda Murni</i>	190-195
Analysis of Regional Financial Independence, Economic Growth Rate of Human Development Index in 34 Provinces in Indonesia <i>Tiur Roida Simbolon; Fitriawaty; Indra Maipita</i>	196-201
Development of Thematic Learning Media For Comics for Beautiful Themes of Diversity My Country to Improve Results Student Learning in Fourth Grade of Public Elementary School 028071 Binjai City <i>Indra Maulana Harahap; Hidayat; Ratih Baiduri</i>	202-213
Expressive Speech Acts in Up in the Air Movie <i>Gusti Rahayu Manik</i>	214-217
Development of Android-Based Learning Media Subject for Class X Drug Matters in 1st Besitang State Senior High School <i>Andi Akbar Suparto; Tarsyad Nugraha; Sanusi Hasibuan</i>	218-220
The Influence of Teaching Style and Student Perception on the Outcomes of Passing Learning in The Volley Ball Game in SMP Negeri 4 Laguboti <i>Martin Edward Manik; Rahma Dewi; Budi Valianto</i>	221-223
The Effect of Teaching Approaches and Linguistic Intelligence on the Students Achievement in Reading Comprehension <i>Muhammad Ilham Adha; Berlin Sibarani; Didik Santoso</i>	224-228
Development of Interactive Learning Media in Character Formation Kindergarten <i>Natalia Noveri Tarigan; Hamonangan Tambunan; Samsidar Tanjung</i>	229-234
Analysis of the Ability of Metacognition of Students of SMAK Country Samosir in Solving Problems Apply Learning Guided Discovery <i>Siita Tamba, Bornok Sinaga, Syafari</i>	235-240
The Influence of PAIKEM Strategy on Reading Interests of VII Grade of SMP Negeri 2 Siberut Selatan <i>Eirene Siagian; Abdurahman Adisahputera; Wisman Hadi</i>	241-246
Development of Local Characteristics Learning Text Learning Media in Indonesian Language Learning in Kartika I-2 SMA Private Vocational School <i>Herza Alwanny; M. Oky Fardian Gafari; Abdurrahman Adisahputera</i>	247-256

Improvement of Mathematical Communication Skills and Student Learning Motivation Through Realistic Mathematics Education Approaches

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Abstract: This study aims to see students' mathematical communication skills and student learning motivation through a realistic mathematics education learning approach, describing the process of students' answers in solving mathematical communication problems. This study is a quasi-experimental research. The research subjects were students of class VIII SMP Negeri 1 Binjai. Then two classes were randomly selected. The experimental class was given PMR learning treatment and the control class with ordinary learning. The instruments used consisted of: a test of mathematical communication skills and a student motivation questionnaire. The purpose of this study was to determine whether: improvement in mathematical communication skills of students who obtained learning with the Realistic Mathematical Approach (PMR) was higher than students who received Conventional learning, increased learning motivation of students who obtained learning with PMR higher than students who obtain Conventional learning, there is an interaction between learning models with students' initial mathematical abilities to increase students' mathematical communication skills, there is an interaction between learning models with students' initial mathematical abilities towards increasing student motivation. The results of this study have explained in detail the research procedures for improving communication skills and student motivation through a realistic mathematics education approach.

Keywords: *Mathematical communication, Learning Motivation, Realistic Mathematic Education*

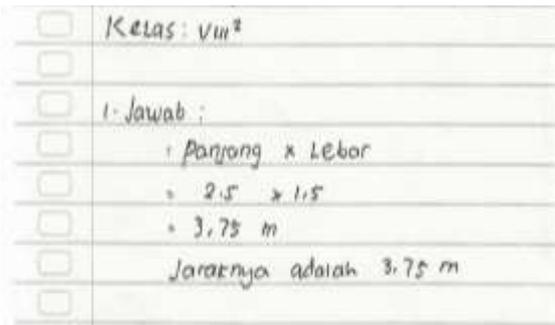
I. INTRODUCTION

Education is all aspects of life in choosing and fostering a good life in accordance with human dignity. Education is a conscious and planned effort to create an atmosphere of learning and learning process so that students actively develop their potential to have spiritual strength, self-control, personality, noble moral intelligence, and the skills needed by the people of the nation and state [1]. It aims to face the challenges of the development of information technology more rapidly. Along with the times, technological advances are increasingly rapidly demanding education to continue to develop and be able to produce high-quality human resources who are able to think critically, creatively, systematically, communicate, be able to solve problems, and have good morals.

One important aspect in learning mathematics is to improve mathematical communication skills. In everyday life a person can not be separated from a communication. Communication can take place between individuals, groups, social, and so forth. In other words, communication is the delivery of messages both verbally and in writing. In teaching and learning activities, communication skills are needed in achieving learning objectives, one of them is in learning mathematics. According to Baroody stated there are two reasons to focus on mathematical communication [2]. The first reason is mathematics is an essential language for mathematics itself. Mathematics is not only a thinking tool that helps students to develop patterns, solve problems and draw conclusions, but also as a tool for communicating thoughts, varying ideas clearly, precisely and concisely. The second reason is learning to teach mathematics is a social activity that involves at least two parties, namely teachers and students. Communicating with friends is an important activity to develop communication skills so students can learn like a mathematician and can solve problems successfully.

The communication that is expected to be established during learning is effective communication that supports the teaching and learning process. Effective communication is shared meaning, shared understanding where its success lies in openness, listening effectively and understanding. Learning mathematics that does not actively involve students will cause students to not be able to use their mathematical communication skills. The task of the teacher is not only as a provider of information (knowledge transfer) but also as a stimulus for students to learn in order to construct their own knowledge. Therefore mathematical communication skills play an important role in helping students build relationships between abstract language and mathematical language symbols that need to be developed early.

Based on observations made at SMP Negeri 1 Binjai, it was found that many students were passive during the learning process so the teaching and learning process was less effective. This learning process seems to cause a learning atmosphere that is not optimal. So students have not been able to communicate mathematically. Even though some mathematics material requires students to communicate the results of their thoughts to others verbally and in writing. One of them is the Pythagoras. Following are the observations obtained



Students are not able to model inward matematika

Based on the results of preliminary observations conducted by researchers at SMP Negeri 1 Private Junior High School in Binjai where students' mathematical communication based on indicators explains the ideas or situations of an image or graphic given in their own words in written form (writing); state a situation with pictures or graphics (draw); and state the situation in the form of mathematical models (Mathematical Expressions) are also still relatively low. From the problems given by researchers to students of class VIII-2 SMP Negeri 1 researchers observed many students who had difficulty in solving problems. According to the factors causing learning difficulties are divided into two, namely internal and external factors [3].

Apart from having mathematical communication skills, the most important thing that students must have is the psychological aspect that contributes to one's success in understanding mathematics well. This psychological aspect is the motivation to learn. Motivation is a process that determines the level of activity, intensity, consistency, and general direction of human behavior [4]. Someone is motivated or compelled to do something because of a goal or need to be achieved. Motivation is formulated as encouragement, whether caused by factors from within or outside the student, to achieve certain goals in order to meet or satisfy a need. In the context of learning, these needs are related to the need to learn. Thus, it can be said that students with low achievement are not necessarily due to their low abilities, but may be caused by a lack of encouragement or motivation. Motivation is a condition contained in a person that causes a person to carry out certain activities to achieve certain goals. Knowledge and understanding of learning motivation in students is very useful for teachers to: generate, increase, and maintain students' enthusiasm to learn until success. The success of learning activities is very much determined by the interaction between students and teachers. States that there are 3 learning conditions that can be found in student groups, namely: The first event, students are reluctant to learn because they do not know the usefulness of subjects in school. These students are low motivated, because they lack information. The second event, students' motivation to learn decreased due to external learning disruption. In both events, student learning motivation got better, after the teacher changed the external conditions of student learning. The third incident students have high learning. Such students are

generally able to overcome their learning disorders and barriers [5]. Recognizing the importance of mathematical communication, the teacher strives to learn by applying learning models that can provide opportunities and encourage students to practice mathematical communication. One of them is a realistic mathematics education approaches. Realistic mathematics education approaches is a learning approach that uses real world problems [6]. Mathematic realistics education is a learning theory that starts from 'real' matters for students, emphasizes 'process of doing mathematics' skills, discussing and collaborating, arguing with classmates so that they can find themselves ('student inventing' as opposed to 'teacher telling') and ultimately use that math to solve both individual and group problems [7]. Through abstraction and formalization students will develop a more complete concept. Then students can apply mathematical concepts to new fields of the real world (applied mathematization). Therefore, to bridge mathematical concepts with children's daily experiences, it is necessary to pay attention to mathematics of everyday experience (mathematization of everyday experience) and the application of mathematics in everyday life.

From the description of the problem above, the researcher is interested in conducting research related to students' mathematical communication processes and student learning motivation. Then the researcher made a research title Improvement Mathematical Communication Skills and Student Learning Motivation Through Realistic Mathematics Education Approaches.

II. RESEARCH METHODS

This research was conducted at SMP Negeri 1 Binjai, with a quasi-experimental research design. The population is all students of SMP Negeri 1 Binjai in the academic year 2017/2018. The selection of grade VIII students as the study population was based on the following considerations: Many mathematics material topics in grade VIII are more interesting when taught with Realistic Mathematics Education (PMR); In terms of age of VIII graders (age range ranging from 14-15 years), generally students are still at the concrete operational stage; In addition, grade VIII students are chosen because they are assumed to be mature enough to accept reforms in the learning approach carried out by the teacher.

Meanwhile, the selection of SMP Negeri 1 Binjai is based on the consideration that the writer hopes that the teachers in this school can make a realistic mathematics approach as an alternative for learning to provide variations to the learning that has been carried out generally still using conventional learning.

The research sample was determined using cluster sampling technique (group sample selection). Group sampling is a method of random sampling based on groups, not based on its members, provided that members of these groups have the same characteristics [8]. Method used in this study is a research and development or *Research and Development*. Methods of research and development or *Research and Development* is a research method that is used to produce a specific product and test the effectiveness of the product.[9].

This research and development methodology is closely related to the field of learning technology. Several decades of research in the field of instructional technology have intersected with issues of product development and design, especially media and teaching materials and learning system design.

This experimental research consists of 3 stages: 1). The preparation stage. At this stage, it begins with an introduction that is used to get problem identification, problem formulation and the literature needed, 2). So that it can be determined the research tools used. Second, the preparation stage begins with a research tool, 3). The implementation stage and data analysis. At this stage, it begins with giving a pretest to students, then in the experimental class action is carried out in the form of a learning model, namely the mathematic realistic education and ordinary learning in the control class. Then the teacher and student activities were observed in both learning models and at the end of the study a test was given to the students' communication skills and student learning motivation.

The planning stage starts with the preparation of learning tools and research instruments, giving (KAM, pretest, and posttest test questions), making observations with a realistic approach and conventional learning, giving posttest test questions, then analyzing the data. planning stage starts from collecting references related to the product being developed, designing media displays, collecting drug material and characteristics of students at the high school level, to the evaluation stage in the developed learning media.

The instrument that has been compiled and developed is tested for expert validity. The instrument was declared feasible after being validated by experts, namely material experts and learning experts. The results of validation by several experts are expected that this instrument is suitable for use in teaching and learning activities. This validity test can be done several times until the validator states it is suitable for use without revision.that has been compiled and developed is subject to expert validity testing. The product is declared feasible after validation by experts, namely media experts, material experts, and learning experts. The results of validation by several experts are expected that this media product is suitable for use in teaching and learning activities. This validity test can be

done several times until the validator states it is suitable for use without revision.

The results obtained are an increase in students' mathematical communication skills taught through realistic mathematics education is higher than students taught by conventional learning.

This can be seen from the results of the two-way ANOVA analysis, it can be seen that for the learning factor, $F_{count} = 18.854$ is greater than $F_{critical} = 3.919$ at the significance stage $\alpha = 0.05$ with 1 x 122 degrees of freedom (0.95F1,122). Therefore, the null hypothesis which states that there is no increase in mathematical communication skills between students who are given a realistic mathematics education approach compared to students who are given a conventional approach is rejected.

The second hypothesis was carried out to test whether there was an interaction between learning and students' initial mathematical abilities towards improving mathematical communication skills.

It can be seen that for the interaction between the approach factor and the ability, it is obtained that $F_{count} = 2.053$ is smaller than $F_{critical} = 3.070$ at the significance stage $\alpha = 0.05$ with 2 x 122 degrees of freedom (0.95F2,122). Therefore, the null hypothesis which states that there is an interaction between the learning approach and students' mathematical abilities towards the improvement of mathematical communication skills is acceptable.

The third hypothesis was carried out to test whether the increase in the mathematical disposition of students taught through realistic mathematics education was higher than students taught by conventional learning.

It can be seen that for the approach factor, it is obtained that $F_{count} = 9.155$ is greater than $F_{critical} = 3.919$ at the significance stage $\alpha = 0.05$ with 1 x 122 degrees of freedom (0.95F1,122). Therefore, the null hypothesis which states that there is no increase in learning motivation between students who are given a realistic mathematics education approach compared to students who are given a conventional approach is rejected. In other words, the increase in student motivation to learn through realistic mathematics education is higher than students taught by conventional learning.

The third hypothesis was conducted to test whether there was an interaction between learning and students' initial mathematical abilities towards increasing student learning motivation.

It can be seen that for the interaction between the approach factor and the ability, it is obtained that $F_{count} = 2.100$ is smaller than $F_{critical} = 3.070$ at the significance stage $\alpha = 0.05$ with 2 x 122 degrees of freedom (0.95F2,122). Therefore, the null hypothesis which states that there is an interaction between the learning approach and students' mathematical abilities on increasing student learning motivation can be accepted.

In the process of student answers in solving test questions

of mathematical communication skills in students taught through realistic mathematics education is better than students taught through conventional learning. This is indicated by the percentage of students' mathematical communication ability tests for the completion of each item on the mathematical communication ability test, where for each item, the complete and correct completion of students taught through realistic mathematics education has a higher percentage than students taught through conventional learning.

III. RESULTS AND DISCUSSION

Based on the results of the study, the average gain score of students' mathematical communication abilities given the PMR approach was 0.51205 higher than students who were given the conventional approach of 0.43014. The results of this study indicate that the average increase in mathematical communication skills of students who are given the PMR approach is higher than students who are given the conventional approach. There is an increase in learning motivation between students who give a realistic mathematics education approach and students who are given a conventional approach. From the mean of the two groups, it shows that students who are given a realistic mathematics education approach have higher learning motivation than students who are given a conventional approach. This is indicated by the average gain score of students' learning motivation given the realistic mathematics education approach of 0.38488, higher than students who were given the conventional approach of 0.33413.

IV. CONCLUSIONS

Based on the results of the analysis, findings and discussion that have been stated in the previous chapter, several conclusions were obtained regarding learning factors, initial mathematical abilities, mathematical communication skills and student learning motivation. The conclusions are as follows: The increase in mathematical communication skills of students who receive realistic mathematics learning is significantly better than students who receive regular learning. This can be seen in the normalized gain calculation in the experimental class which is higher than the control class. The increase in learning motivation of students who received realistic mathematics learning was significantly better than students who received regular learning. This can be seen in the

normalized gain calculation in the experimental class which is higher than in the control class. There is no interaction between learning and students' initial mathematics abilities (high, medium and low) on the improvement of mathematical communication skills. This also implies that the interaction between learning and students' initial mathematics abilities (high, medium and low) does not have a significant joint effect on improving mathematical communication skills. The difference in the increase in mathematical communication skills is caused by differences in the learning used not because of the students' initial mathematical abilities. There is no interaction between learning and students' initial mathematics abilities (high, medium and low) on increasing student motivation. It also means that the interaction between learning and students' initial mathematics abilities (high, medium and low) does not have a significant joint effect on increasing student learning motivation. The difference in the increase in learning motivation is caused by differences in the learning used not because of the students' initial mathematical abilities.

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