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Education, Learning and Leadership Innovation

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“Education, Learning, and Leadership Innovation”

Emerald Garden Hotel, Medan City, North Sumatera, Indonesia
October 3-4, 2018

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Preface

The 3rd Annual International Seminar on Transformative Education and Educational Leadership (AISTEEL 2018) was held in Emerald Garden Hotel, Medan City-Indonesia on 3-4 October 2018. 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 “Education, Learning and Leadership Innovation.” The plenary speakers coming from various provinces in Indonesia 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.

The third AISTEEL presents a keynote speaker and 4 distinguished invited speakers from Australia, Singapore, Taiwan, and Malaysia. In addition, presenters 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.

There are 326 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 198 of them were accepted for published by Atlantis Press indexed by International Indexation. Meanwhile 83 papers were published in online International Proceedings 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 3rd Annual International Seminar on Transformative Education and Educational Leadership (AISTEEL 2018) for their outstanding contributions. Thanks also given to Universitas Negeri Medan for published this volume.

The Editors

Bornok Sinaga
Rahmad Husein
Juniastel Rajagukguk
# Table of Contents

<table>
<thead>
<tr>
<th>Titles and Authors</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design of Physical Practicum Tools on Rotational Dynamics Matter with Scientific Concept</td>
<td>1</td>
</tr>
<tr>
<td><strong>Fretty Doharni Ritonga; Nurdin Bukit; Betty M. Turnip</strong></td>
<td>1</td>
</tr>
<tr>
<td>Analysis of the Leading Sector and Its Effect on the Economy in Pakpak Bharat Regency</td>
<td>6</td>
</tr>
<tr>
<td><strong>Dinar Melani Hutajulu; M. Nasir; Arwansyah</strong></td>
<td>6</td>
</tr>
<tr>
<td>Analyze the Characteristic and Factors Cause of Bullying Behaviours in Early Childhood</td>
<td>12</td>
</tr>
<tr>
<td><strong>Fadhilah Syam Nasution; Anita Yus; Aman Simaremare</strong></td>
<td>12</td>
</tr>
<tr>
<td>Play Finger Painting in Creative Art Model to Help Smooth Motoric Development and Creativity of Group a in Kindergarten at Aek Loba Pekan Village</td>
<td>18</td>
</tr>
<tr>
<td><strong>Lola Wita Harahap; Sri Milfayetty; Rosmala Dewi</strong></td>
<td>18</td>
</tr>
<tr>
<td>Maintenance of Gayonese Kinship Terms by Gayonese Minority Migrants in Jabodetabek</td>
<td>22</td>
</tr>
<tr>
<td><strong>Desi Purnama Sari; Siti Aisyah Ginting; Berlin Siburani</strong></td>
<td>22</td>
</tr>
<tr>
<td>Effect of Functional Training and TRX Suspension Training on Body Composition member Golden Fitness and Spa</td>
<td>26</td>
</tr>
<tr>
<td><strong>Rafliansyah; Nurhayati Simatupang; Albadi Sinulingga</strong></td>
<td>26</td>
</tr>
<tr>
<td>Interpersonal Metaphor Used in the Boss Baby Movie</td>
<td>29</td>
</tr>
<tr>
<td><strong>Khairuni Syafitri; Siti Aisyah Ginting; Anni Holila Pulungan</strong></td>
<td>29</td>
</tr>
<tr>
<td>Speech Act in Indonesia Lawyers Club: KPK vs Novanto</td>
<td>32</td>
</tr>
<tr>
<td><strong>Theresia Fransiska Sidabutar; Zainuddin; Busmin Gurning</strong></td>
<td>32</td>
</tr>
<tr>
<td>The Effect of Instructional Strategy and Style Ofthinking Sequential on Students Outcome MAN Medan</td>
<td>36</td>
</tr>
<tr>
<td><strong>Siti Aisyah Hanim; Tiur asih siburian; Darwin</strong></td>
<td>36</td>
</tr>
<tr>
<td>The Effect of Cooperative Learning Models and Self Efficacy on Student Mathematics Learning Outcomes</td>
<td>39</td>
</tr>
<tr>
<td><strong>Sabdo Puji Rahayu; Mukhtar; Keysar Panjaitan</strong></td>
<td>39</td>
</tr>
<tr>
<td>Ideational Grammatical Metaphor in Reading Texts for Senior High School English Textbooks</td>
<td>43</td>
</tr>
<tr>
<td><strong>Diemam Ferzhawana; Siti Aisyah Ginting; Zainuddin</strong></td>
<td>43</td>
</tr>
<tr>
<td>Effect of Soft Modification on Student Learning Results PAB 13 Kwala Begumit Private Vocational School</td>
<td>47</td>
</tr>
<tr>
<td><strong>Iskandar Fahmi</strong></td>
<td>47</td>
</tr>
<tr>
<td>Differences in Metacognitive Ability of Students Through Learning Realistic Mathematics Education and Problem Based Learning in Pangkalan Susu Senior High School</td>
<td>51</td>
</tr>
<tr>
<td><strong>Chairi Mutia Lubis; Waminton Rajagukguk; Kms.M. Amin Fauzi</strong></td>
<td>51</td>
</tr>
<tr>
<td>Development of Interactive Learning Media Projection of Working Drawing on Students of Class X TKR in SMK Markus 2 Medan</td>
<td>56</td>
</tr>
<tr>
<td><strong>Irwan Panggabean; R. Mursid; Samsidar Tanjung</strong></td>
<td>56</td>
</tr>
<tr>
<td>Metaphor of Modality in Donald Trump’s Speech in United Nation General Assembly 2017</td>
<td>60</td>
</tr>
<tr>
<td><strong>Nursyah Handaya; Siti Aisyah Ginting</strong></td>
<td>60</td>
</tr>
<tr>
<td>Traditional Sport Of Silek Tuo In Minangkabau Community (a study of Silek tuo advice)</td>
<td>63</td>
</tr>
<tr>
<td><strong>Iskandar Fahmi</strong></td>
<td>63</td>
</tr>
</tbody>
</table>
Prima Nanda; Sabaruddin Yunis; Agung Sunarn........................................... Improved Student’s Generic Science Skills With The Application of Cooperative Learning Models Based on Batak Culture

Rika Sari Indah Harahap: Derlina; Rahmatsyah; Sahyar; Bornok........................................... 66 Management Development Athletes of Shorinji Kempo North Sumatra Region

Arti Kurniatiy Bangun........................................... 71 Efforts to Improve Learning Results Free Basketball Shot (Free Throw) Through The Application of Teaching Style Inclusion

Bob Rahmat Manalu........................................... 75 Development of Egosan Engineering Extension Models with Straight Sticking in Pencak Silat

William Filipus; Amir Supriadi; Tarsyad Nugraha........................................... 77 The Development of Interactive Learning Media of Athletic on Physical Education in SMP Negeri 15 Medan

Akhnad Khaidir; Budi Valianto; Tarsyad Nugraha........................................... 81 The Effect of Learning Model and Self-Reliance Learning toward Science Learning Outcomes

Rohima; Mukhtar; Samsidar Tanjung........................................... 84 The Effect of Learning Method and Kinesthetic Perception on The Learning Outcomes of Lay Up Basketball

Saiful Adrian; Nurhayati Simatupang; Suprayitno........................................... 88 Analysis Of Physical Education Teacher Management Skills In State Elementary School Sub-District Medan Tembung

Syahrul Effendi Nasution; Amir Supriadi; Albad Sinulingga........................................... 91 Innovation Of The Speed Model Using Running With The Ball Techniques In Football

Julio Roberto; Amir Supriadi; Novita........................................... 95 The Development of Penetration Drill Training Technique of Wrestling Sport

Ihsan Idris Silalahi; Jan Bobby Nesra Barus........................................... 99 Speech Function of Anies Baswedan’s Speech in Approval Ceremony as the Governor of Jakarta in the Period of 2017-2022

Ahmad Rifa’i Ritonga; Sumarsih........................................... 102 Development of Web-Based Learning Media to Enhance Writing Capability of Biography Text of Student Class X SMA

Rencus B. Sinabariba, Tiur Asi Siburian, Mutsyuhibo Solin........................................... 105 Implementing the Teaching Supervision by Principals in Improving the Performance of Teachers in Aceh Besar

Said Ashlan........................................... 109 Female Principal Leadership

Hendro Widodo; Hengkgar Bara Saputra........................................... 115 The Ways of Rohingya Teenagers in Medan Realized Their Language Attitude

I Wayan Dirgagasa; Rahmat Husein; Lonni Nurfih Nasution........................................... 120 Metaphor in Umpasa of Saurmatua Toba Batak Ceremony

Heppy Yersin Digita Purba; Rahmad Husein; Anni Holila Pulungan........................................... 124 The Influence of Part Method, Whole Method and Determination Exercise Methods on Improving Exercise in the Sports Branch of Pencak Silat Single Art Category of College Students SPDKK (Art of Kencana Kwitang Self Defense) Deli Serdang Year 2018/2019

Mawar Sari........................................... 127 Figurative Expressions in The Karo Batak Wedding Ceremony Generated by The
Philosophy of Rakut Sitelu
Desi Haryati Nianggolan

Evaluation of Implementation of Sustainable Professional Development (PKB) for Junior High School Physical Education Teachers to Increase Professionalism in Tebing Tinggi City
Mhd Fazar Afandi

Development of Innovative PJOK teaching materials on floor gymnastics materials to improve learning outcomes of Grade Students at Junior High School
Bangun Saragih

The Influence of the Discovery Learning Model assisted with Image Media and Motivation Against Civics Learning Outcomes of Students in Class IV of Public Elementary Schools 055980 Aman Damai 2017/2018
Heryansyah Ginting; Dede Ruslan; Reh Bungana Br.Perangin-angin

Development of science teaching materials based on Science Technology Society (STM) and its influence on learning outcomes of fourth grade students of MIN Medan Tembung
Diah Hafizhotul Husna; Nuraini; Ramlan Silaban

The Improvement of Cooperative Learning Model Application Skill in Numbered Head Together Through Clinical Supervision of Art Teacher in SDN 060886 Medan Baru
Unita Vitta Omas Sianturi; Martua Manullang; Rosmala Dewi

Gold of North Sumatera Program Coach Performance
Suyono; Hariadi; Supryetna

Transitivity Systems Analysis of Bilingual Civic 3 Education Textbook for Grade XII
Jusup Sitepu; Anni Holila Pulungan; I Wayan Dirgeyasa Tangkas

The Lecturer Performance Development of the STKIP Bina Bangsa Getsempena Banda Aceh
Saiful Bahri

The Interference of Batak Mandailing Language to Indonesian (In The Interaction At The Seventh Grade Students Of Madrasah Tsanawiyah Swasta Al-Azhar Kabupaten Tapanuli Selatan Padang Sidimpuan)
Siti Jahria Sitompul; Abdurrahman Adisaputra; Sumarsi

The Influence of Microbiology Dictionary and Microbiology Textbook Utilization in the Contextual Learning Framework on Biology Students Higher Order Thinking Skills
Kiki Rizqi Sahara; Hasruddin; Ashar Hasairin

The Differences of Learning Style and Students’ Creativity to Students’ Achievement in Dribbling the Ball in Playing Football of Seventh Grade Students of SMP Ar – Rahman Percut
Muammar Afif Marpaung; Imran Akhmad; Rahma Dewi

Development of Gobag Sodor Game Model to Increase Interest in Elementary Students
Siska Nova Undari

The Influence of Research-Based Learning with Portfolio Assessment on Science Process Skills in Microbiology Course for Biology Program Students
Saudah Rahmayanti; Hasruddin; Tumiar Gultom

The Influence of Teaching Style and Confident Against the Results of a Study of Shooting in the Game of Football (Experiment Studies the Self Check Style and the Guided Discovery Style at a Private Junior High School Seventh Grader
Development of Mirror Writing Teaching Materials Based on Class XI Media Literation of Lolomatua 1 State High School

Yanida Bu’ulolo; Biner Ambarita; Marice

The Development of Teaching Materials for Technology-Assisted Procedure Text in Vocational High School

Nova Andarini; Biner Ambarita; Malan Lubis

Development of Adobe Flash Based Floor Gymnastics Media Learning on Health Sport Education Lesson

Hardiansyah

The Effect of Learning Approach and Linguistic Competence Capability Reading The English Narrative Text of Student SMA Negeri 6 Padangsidimpuan.

Sukriyah Batubara; Keysar Panjaitan

Analysis Effect of Household Consumption, Investment and Labor to Economy Growth In Sumatera Utara

Richna Handriyani; Arwansyah; Sahyar

Idioms Translation Strategies in Pasung Jiwa Novel English Version

Hariyanto; Amrin Saragih; Sumarsih

Code Mixing in Novel: A Case of Indonesian Literary Work

Nurul Hidayanti Hasibuan; Amrin Saragih; Sumarsih

Logico-Semantic Relation in Presidential Debate Between Hillary Clinton and Donald Trump

Annisa Risma Khairani Lubis; Della Fransiska Ginting; Jumino Suhadi

Semiological Meanings in Cigarette Advertisement Texts

Rodearta Purba; Zainuddin; Amrin Saragih

Modality as Hedging Device in the US Presidential Election Debate

Roobby Hamdanur; Anni Holila Pulungan; Zainuddiin

The Improving Mathematical Communication Ability Through Realistic Mathematical Approach Based on Toba Batak Culture

Aman Sanusi Siregar

Speech Functions of Doctors and Patients on Medical Consultation Process

Resti Citra Dewi; Anni Holila Pulungan, Sumarsih

The Development of Venturimeter Instrumentation in Dynamic Fluid

Zahrani Dalimunthe; Rahmatsyah; Derlina

Lexical Metaphors in Onang-onang of Bobby and Kahiyang Tortor Dance

Siti Rahma Ritonga; Anni Holila Pulungan; Didik Santoso

The Discourse Markers in President Joko Widodo’s Speeches in KTT APEC China in 2015

Syahbuddin Nasution1; Busmin Gurning; I Wayan Dirgayasa Tangkas

Preparation of Papers in Two-Column Format for AISTEEL Conference Proceedings Translator’s Strategies in Transferring Cultural Values in Ratatouille Film

Femy Septiani; Anni Holila Pulungan

Lexical Metaphor In Printed Car Advertisements

Misdiana; Siti Aisyah Ginting; Amrin Saragih

Political Discourse Analysis of Donald Trump Political Speech

Elisa Silviani Siregar; Prof. Dr.Zainuddin, M.Hum; Prof.Dr. Sri Minda Murni, MS

Motivation of Farmers in Group Management to Develop Maize Cultivation
Nurliana Harahap; Mahendra Ginting Manik; Indah Listiana
Appraisal of Healthy Product Advertisement on Television

Nurun Nazipah Harahap; Siti Aisyah Ginting; Rahmad Husein Napitupuluh
Lexical Metaphor in Andrea Hirata’s “The Dreamer” Novel

Nurul Sa’adah; I Wy. Dirgeyasa; Siti Aisyah Ginting
Impoliteness Strategies Used by Governor Candidates of DKI Jakarta in Governor Election Debate 2017

Sri Minda Murni; Busmin Gurning
Interextuality in Travel Umroh Advertisement

Afifah Nurul Khoirot Nasution; Anni Holila Pulungan; Eddy Setia
Intertextuality on Oral Discourse in Sari Matua Batak Toba Ceremony

Dyan Yosephin Hutagalung; Anni Holila Pulungan; Rahmad Husein
The Effect of Mangosteen (Garcinia mangostana L) Peel to Creatine Kinase Serum in Male Rats (Rattus norvegicus) with Fatigue from Swimming

Rika Nailuvar Sinaga; Jumadin IP; Zulaini
Analysis of Technology Utilization to Measure the Throw Distance of the Ball on Hammer Throw

Riki Prastian; Agung Sunarno; Sabaruddin Yunis Bangun
The Interactions of Social Stratification and Karonese Register in Giving Pedah

Elkana Putra Tarigan; Amrin Saragih; Siti Aisyah Ginting
Implementation Management Training Volleyball Club of Pertamina Year 2017

Reza Wibowo; Sanusi Hasibuan; Budi Valianto
Lexical Metaphor in Printed Car Advertisements

Misdiana; Siti Aisyah Ginting; Amrin Saragih
Improving Students’ Reading Comprehension Ability in Descriptive Text Through Flashcard

Aisyah Hartati
The Role of Teacher’s Training Model and Technological Approach to the Improvement of Teachers’ Professionalism

Intan Sufiah Batubara
The Difficulties of Students at the Second Year of St. Thomas 3 Senior High School Medan in Translating English Idioms into Indonesian

Fitri Susi Sinurat
The Effect of Applying the Great Wind Blows Strategy on the Students’ Vocabulary Mastery

Gisca Irdayana Lubis
Attitude of Examiners in Thesis Convocation

Mara Sutan Siregar
Politeness Strategies in Mandailing Wedding Ceremony

Nurun Nazipah Harahap; Fatma Raudah Siregar
Analysis of Technology Utilization to Measure The Throw Distance of The Ball on Hammer Throw

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Abstract - The focus of the problem in this study is how to use a digital distance metre instrument and how it works in measuring the distance from falling to the ball. This study aims to find out how the digital distance metre measuring instrument works in measuring the distance of a hammer throw. This study uses the Research and Development method. The place to make a digital distance metre tool was conducted at the State Vocational School of Patumbak for 6 weeks. Furthermore, the implementation of the tools and data collection would be carried out at the Medan State University Stadium for 30 days; the trial would be carried out 1-2 times a week. Subjects in this study were 4 athletes from the student education and training centre athletes and 2 from the North Sumatera Gold Programme at Medan State University, for a small group trial of 3 athletes and a trial of a large group of 6 athletes. A data collection technique to obtain the data needed in this study which was then analyzed, was by a literature study, functional test, and measurement error test. Data analysis techniques used were data from the results of questionnaires classified into two groups of data, namely qualitative and quantitative data. Qualitative data was obtained through expert validation activities and trial activities in the form of input, responses and criticism and suggestions. While quantitative data in the form of difference comparisons, collected through field trials, were analyzed with descriptive quantitative analysis. To find out whether there were differences between tools and meters in small group trials and large groups used t-test analysis with a significance level of 5%.

Keywords: Digital Distance Metre, Hammer Throw

1. INTRODUCTION

The progress of science and technology has greatly facilitated human in various activities as well as has been considered a solution to each existing problems. Likewise, technological advances in the field of sports have greatly contributed to the increase in training and performance of athletes. The use of technology as an effort to improve performance in sports has been carried out in developed countries in Asia such as Japan, China and Australia. This is evidenced by the presence of various sports science laboratories, including in Japan, the JISS (Japan Institute of Sport Science), in Australia there is the AISS (Australia Institute of Sport Science), in China there is a BISS (Beijing Institute Of Sport Science) and many in the country other advanced [3].

Technology also has an important role to help progress in the field of sports, one of them is athletic. Athletics is one of the oldest sports branches when compared to other sports. Syarifuddin states that "athletics is one of the branches that are competed consisting of street numbers, running, jumping and throwing" [6]. In sports, the athletics throw and jump numbers such as javelin throwing, disc throwing, bullet throwing, hammer throw, long jump, and arms jump in which numbers that require measurement away a throw and jump to determine the athlete's performance. The measurement results are determined by how far the throw and jump range is carried out by the athlete. Thus, the farther the results of the throw and jump, the better the level of achievement of the athlete will be. Repelling bullets is one of the athletic sports that are often competed in every athletic event, both domestically and abroad. In the sport of bullet repelling it is very important to analyze the measurement of the distance of an athlete's repulsion. The results of measuring away repulsion are very necessary to see the achievements and performance of athletes both during training and matches.

In Indonesia, the development of test equipment and the measurement of a bullet is still underdeveloped. This was evident during the North Sumatra Regional Sports Week (Porwil) event held in Batubara Regency in April 2018, where the measuring instrument in the bullet-proof match was still using a manual measuring instrument (meter). Therefore, the problem that occurs in the measurement of the distance from the repulsion of the bullet is still using a distance measuring device using a steel measuring tape or ordinary meter. Uneven soil can also cause measurement results using manual measuring devices to be incorrect. So that this can cause measurement activities to be less effective and efficient. From the results of the acquisition of measurements using the tool is also still less accurate, it must be converted again into data in accordance with the expectations of the coach. Therefore it is necessary to develop modifications to the measuring device so that it can save energy and time. To facilitate training and competition activities, advanced technology is needed that can help athletes, coaches, and judges more easily in analyzing the results of measurements of a bullet made by an athlete.

Therefore, the study this time will make a productivity tool that serves to measure the results of a shot. The results of this analysis are in the form of calculating the distance of the fall of the bullet repulsion at a distance between 0-100 meters.
according to the needs of the researcher. A series of Digital Distance Meter devices with Arduino and GPS Module as supporting equipment used to measure the distance of this bullet repulsion are applied with the intention of being able to replace the steel measuring tape (meter) with a manual system. Steel measuring tape (meter) is replaced with a device called Digital Distance Meter. In addition, this tool can also be used to measure other athletic sports related to distance, such as athletic throwing and jumping numbers.

II. METHODS

This study uses research with the Research and Development (R & D) method. R & D is a research method used to produce a particular product, and test the effectiveness of the product. Research and Development, according to Sujadi is "a process or steps to develop a new product, or perfect an existing product that can be accounted for" [2]. This study aims to change the steel measuring tape using Digital Distance Meter, its operation makes it easy for users such as athletes, judges, and trainers both in training and in competitions.

Following is a picture of the research steps:

![Research Flowchart](attachment::research_flowchart.png)

**Fig 1. Steps for using the method ‘Research & Development’ (R&D) [5]**

The act of making a bullet-proof distance measuring device will take place at State Vocational School of Patumbak (SMK Negeri 1 Patumbak) which is made from a set of distance detection devices consisting of a GPS Module, the main Arduino circuit, and a battery for 6 weeks. Furthermore, the implementation of the tools and data collection will be carried out at the Medan State University Stadium for 30 days, the trial will be carried out 1-2 times a week.

Subjects in this study were 4 athletes from the student education and training centre, 2 athletes from the North Sumatera Gold Programme in which 3 athletes for a small group trial, and for a large group trial will require 6 athletes.

**Data collection technique**

Data collection techniques are used to obtain the data needed in this study which is then analyzed. The technique used in data collection is by way of:

1) **Library Studies**

Data is also taken from literature studies related to the object of research so that later it is expected to be able to help researchers to make a decision on the results of the research that has been conducted.

2) **Functional Test**

This functional test is carried out in order to find out whether each athlete works according to its function properly or not. Includes: testing Digital Distance Meter tools, the accuracy of Digital Distance Meter tools, and use of measuring sticks.

3) **Measurement Error Test**

Measurement error measurement is done by comparing the results of manual measurements with the measurement results on the device. Data is taken by testing in the field. Testing the measurement error by comparing the results of manual measurements of steel tape measuring instruments with the measurement results of Digital Distance Meter devices.

The tool used for data collection in this study was a questionnaire. The questionnaire is used to find out the opinions of respondents to the Digital Distance Meter tool. Data from the results of questionnaires that have been collected will then be analyzed.

**Data analysis**

Data from questionnaire results have been collected, then the data is classified into two groups of data, namely qualitative and quantitative data. Qualitative data is obtained through expert validation activities and trial activities in the form of input, responses and criticism and suggestions. While quantitative data in the form of difference comparisons, collected through field trials, were analyzed with descriptive quantitative analysis. To find out whether there are differences between tools and meters in small group trials and large groups used t-test analysis with a significance level of 5%. The percentage is intended to find out the status of something presented and presented as a percentage. After being disseminated, it is then translated into qualitative sentences.

The questionnaire used to obtain data in this study is an assessment or response questionnaire. The questionnaire used is in the form of "Agree" and "Disagree" answers. Based on the number of opinions or answers, then the researcher squeezes each answer using a formula.

The formula for calculating the feasibility according to Sugiyono[4] is as follows:

\[
P = \frac{X}{100}
\]

Description:

- \( P \) = Percentage of evaluation results of trial subjects
- \( X \) = Number of answer answers by trial subjects
- \( X_1 \) = Number of maximum answers in aspects of assessment by test subjects try
- \( 100\% = \) Constantan.

The results of the questionnaire were analyzed with the following criteria:

**TABLE 1. SKALA LIKERT CATEGORY**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worthy</td>
<td>4</td>
</tr>
<tr>
<td>Decent enough</td>
<td>3</td>
</tr>
<tr>
<td>Inadequate</td>
<td>2</td>
</tr>
<tr>
<td>Not feasible</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Sugiyono [4]
Data obtained through questionnaires were then tested using a percentage test. The percentage test will be tested using the formula:

\[ P = \frac{F}{N} \times 100\% \]

**Description:**
- \( P \) = Percentage
- \( F \) = Amount obtained
- \( N \) = Number of respondents

The collected data were analyzed with quantitative descriptive analysis techniques which were revealed in the distribution of scores and percentages on the categories of the predetermined rating scale. After presenting it in percentage form, the next step is to describe and draw conclusions about each indicator. Appropriate aspects of media development tools can use the following table:

<table>
<thead>
<tr>
<th>Table 2. Percentage Category</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Percentage of Achievement</strong></td>
</tr>
<tr>
<td>76-100%</td>
</tr>
<tr>
<td>56-75%</td>
</tr>
<tr>
<td>40-55%</td>
</tr>
<tr>
<td>0-39%</td>
</tr>
</tbody>
</table>

*Source: (Suharsimi Arikonto) [1]*

The table above states the percentage of achievement, value scale and interpretation. To determine the feasibility of using media tools. The table above is a reference for assessing data generated from expert validation.

**III. DISCUSSION**

The concept of this research is to develop a bullet-proofing device with Digital Distance Meter which can be used as a training tool and an athletic match. This development will support sports achievement and become more economical than previous manual measuring devices. The product in this development research attempted to make a distance measurement tool for bullet repulsion using media technology, besides that it could also be used to measure other athletic sports related to distance, such as athletic sports throwing and jumping numbers.

Then this product is expected to be the latest innovation in measuring instruments that are more effective and efficient when used for training or competition and can be used as a solution to the problem of measurement with manual measuring devices.

The research that will be developed has the following specifications:

**TABLE 3. DIGITAL DISTANCE METER TOOL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Picture</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LCD Keypad Shield 16x2</td>
<td><img src="image1.jpg" alt="Picture" /></td>
<td>To display digital data to the LCD display. And the button/keypad/button functions to execute the specified task/choice.</td>
</tr>
<tr>
<td>2</td>
<td>Module GPS Neo-6m</td>
<td><img src="image2.jpg" alt="Picture" /></td>
<td>To receive and send data to the satellite to determine the GPS position.</td>
</tr>
<tr>
<td>3</td>
<td>GSM GPRS SHIELD Sim900</td>
<td><img src="image3.jpg" alt="Picture" /></td>
<td>To receive and send data to the intended mobile number, in the form of message data.</td>
</tr>
<tr>
<td>4</td>
<td>Arduino Uno SMD</td>
<td><img src="image4.jpg" alt="Picture" /></td>
<td>As open source electronics that are made to facilitate us in developing or creating electronic devices that can interact with other electronic devices.</td>
</tr>
<tr>
<td>5</td>
<td>Modul Micro SD Card Reader Writer</td>
<td><img src="image5.jpg" alt="Picture" /></td>
<td>To save and read data in SD Card.</td>
</tr>
</tbody>
</table>

The research process is carried out in various ways according to the needs that are needed, measuring the results of repulsion in the field of athletics, namely by using a special set of digital devices equipped with Arduino and GPS Module so that the results of calculation of the distance of the fall of the bullet repulsion by the athlete can be immediately known. The use of this tool is also facilitated simply by pressing the START button on the edge of the bullet field beam, after the
athlete has repelled the falling bullet then put the digital device and press the Finish button, then the distance of the falling bullet that has been done by the athlete can be seen immediately until millimetres. This tool is also accompanied by the transfer button where its use can transfer data obtained by the digital device to the Laptop / PC / Smartphone automatically if we press the Transfer button. So that the calculation of the measurement results can be directly seen by athletes, coaches, and judges.

IV. CONCLUSIONS

Analysis of the use of Meter Measuring Technology through Digital Distance Meters to Measure Reject Distance in Reject Bullets is expected to facilitate athletes, coaches, and judges in training activities or competitions in athletic sports, number of bullets. In addition, this tool can also be used to measure other athletic sports related to distance, such as athletic throwing and jumping numbers.

Some suggestions from researchers for the next research is that it can be developed to be even better and develop more advanced technology in accordance with the times. Repair the system again or how it works more than the existing tool.

REFERENCES