

# The Development of Venturimeter Instrumentation in Dynamic Fluid

Zahrani Dalimunthe  
Post Graduate, Universitas Negeri  
Medan  
zahrani334@yahoo.com

Rahmatsyah  
Post Graduate, Universitas Negeri  
Medan

Derlina  
Post Graduate, Universitas Negeri  
Medan

**Abstract** - This research aims to analyze the validities, the practicalities, the effectiveness of the venturimeter instrumentation in dynamic fluid. This research constitutes the research and development ( R & D ) through ADDIE design including; analyze, design, development, implementation, and evolution stages which refers to the process of development research by Robert Maribe Branch. This research conducted in Senior High School Number 3 Langsa, and the population of this research consist of 30 students. The venturimeter instrumentation validated by master of media validator in higher score validity 86,9 percent is very well category. The practicalities of venturimeter instrumentation from students' reaction is 96.9 percent. The learning activity carried out in amount of 83.3% and the effectiveness of venturimeter instrumentation that developed from classical learning result is 89 percent. The venturimeter instrumentation completed by students.

**Keyword** – development; ADDIE design; instrumentation; venturimeter.

## I. INTRODUCTION

Development of Science and Technology has contributed to the world of education, especially science education. Physics as part of education in general has a role in improving the quality of education, especially in producing quality people. Quality human beings are capable of thinking critically, creatively, logically and taking the initiative in responding to various issues in society so that they can solve problems due to the impact of the development of science and technology. (Turnip, 2016:177).

According to Folmer, science education including physics has an important role in improving the quality of human resources who are strong, creative and able to adapt to the developments that occur in society. To realize this, teachers as the spearhead of education play a very important role in managing learning in accordance with the principles of teaching and learning activities. Teachers are expected to be more creative, innovative in carrying out student-based learning (student center learning) so that students can develop as optimally as possible (Derlina, 2016: 153).

Physics is one of the sciences and is a science that was born and developed through the steps of observation, problem formulation, hypothesis formulation, hypothesis testing through experiments, drawing conclusions, and the discovery of theories and concepts. Physical knowledge consists of many concepts and principles that are generally very abstract (Agustianti, 2015: 1).

Curriculum demands on the subject of Physics are basically to deliver students to understand the concepts of physics and their relevance in solving problems found in everyday life. Physics learning has been trapped in chalk and talk routines. Thus the learning process, especially physics subjects at school, has not provided the expected results (Wulantri, 2017: 4).

Seeing the above facts, the teacher is required to make improvements in the learning process. Teachers are obliged to provide new innovations such as the use of learning methods and media that are in accordance with the material being taught.

According Arsyad learning media is a component of delivery strategies that can be loaded with messages that will be delivered to students, whether in the form of people, tools or materials. Media is defined as an inseparable part of the teaching and learning process in order to achieve educational goals in general and the objectives of learning in schools in particular. (Sasrawati 2017: 72).

Instruments are learning media that can facilitate students because students can directly see, observe and understand the actual process of the incident. Instruments are able to arouse students' motivation in learning physics. Instruments are also able to stimulate students to be more active so that the learning process becomes more interactive and not monotonous. So that teaching aids are very effective and efficient to be used in the learning process of physics (Afriyanto: 2015: 21).

Venturimeter is one of the instruments in dynamic fluid which is an application of the Bernoulli principle used in physics learning in determining the flow rate of a fluid through a pipe by measuring the pressure difference created

by contractions in the pipe. If the flow goes through contraction it will quickly rise, so the pressure will drop. The use of venturimeter instruments can be implemented with innovative learning models such as experiments. The teaching aids developed by researchers use the ADDIE design, an educational product development design and other learning resources consisting of Analyze, design, development, implementation and evaluation.

Based on the pre-research conducted in SMA 3 Langsa city, the results of the analysis of learning problems from the results of interviews with the teachers of SMA N 3 in Langsa City, that learning physics in schools was still teacher-centered, the completeness of the learning media was still very minimal, especially the venturimeter instruments did not yet exist. This has implications for student learning outcomes that are below the KKM. The teacher explains learning physics by using discussion methods. Another fact, that 75% of students say that physics is difficult. Limitations of teaching aids become obstacles not to do experiments or experiments. The results of instructional analysis that venturimeter teaching aids are needed by teachers and students as a support in learning activities and venturimeter teaching aids that will be developed can be accepted by students. SMA N 3 school in Langsa city requires venturimeter instruments as a medium to support activities in physics learning.

Based on this background, researchers found the idea to create and develop a simple venturimeter instruments, using a manometer that is connected to a blower by varying the types of fluid present in the manometer namely water, cooking oil and alcohol, therefore researchers are interested in doing research with title "Development of Venturimeter Instruments in Dynamic Fluids in High School".

## II. RESEARCH METHODS

The type of research used is research with the design of ADDIE (Analyze, Design, Development, Implementation, Evaluation) by Robeth Maribe Branch. The research instruments used were questionnaires, interviews, and classical learning outcomes instruments.

In this study, data collection was done in several ways including interviews and questionnaires. Wawnvara's results were used to determine the problem analysis of learning in schools, while the questionnaire was used to determine the analysis of the needs of venturimeter teaching aids by teachers and students, validation questionnaires to determine the feasibility of the venturimeter teaching aids developed, questionnaires for student responses to determine the practicality of teaching aids developed by the learning questionnaire for knowing the effectiveness of the venturimeter instruments used.

Interviews were conducted randomly, namely to several physics teachers in schools listed in the background. Interviews are conducted directly (face to face) with the teacher in question.

Data analysis in this study is using taxonomic qualitative analysis techniques, namely data collection continuously through observation, interviews and documentation so that the collected data becomes a lot. This analysis serves to describe the characteristics of the data in order to create a better product. In this way it is expected to make it easier to understand the data for the next process. The results of data analysis are used as a basis for revising instruments products that are developed.

## III. RESULTS AND DISCUSSION

In this research and development produce venturimeter physics teaching aids in dynamic fluid material that has been validated, tested and repaired. The final product of this physics teaching aids can be used in learning activities or as a tool to explain the concept of matter.

The results of this research and development are data about the specific needs needed in developing a venturimeter teaching aids regarding the design and feasibility of teaching aids. The feasibility data of the teaching aids is obtained from the questionnaire calculation when validating by media experts (product) and the teacher as validator, questionnaire to find out the students' responses as well as the learning implementation questionnaire.

The results of the analysis of the data obtained from the research show; (1) venturimeter instruments developed through ADDIE design are suitable for use (2) venturimeter instruments that are developed practically; (3) venturimeter instruments developed effectively. Therefore it is feasible to use it as a teaching aid in dynamic fluid learning with the following reasons: In general, the feasibility of a venturimeter instruments that have been implemented in the actual situation until the evaluation stage can be seen in the picture below:

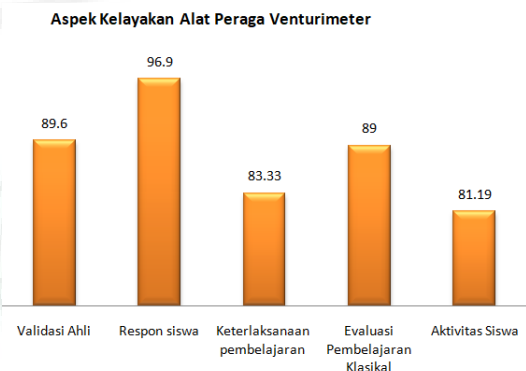


Fig 1. Validity Of Venturimeter Instruments

#### IV. CONCLUSION

1. The validity of venturimeter teaching aids using ADDIE design is valid for use as a learning medium with an average total validity by media expert validators of 89.6% with very good categories.
2. Practicality of venturimeter teaching aids using ADDIE design from response responses to venturimeter teaching aids by 96.9% with very good categories and learning effectiveness of the use of venturimeter instruments by 83.3% with very good categories.
3. The effectiveness of the venturimeter device is based on the results of evaluation of classical learning using venturimeter teaching aids by 89% of students complete. The results of observations of student activities are 81.19%

#### *Suggestion*

Based on the results of the research and conclusions above, it can be suggested as follows:

1. This venturimeter instruments using ADDIE design has fulfilled the validity, practicality and effectiveness aspects, so it is suggested to the teacher to be able to use this venturimeter device in the dynamic physics of fulide material learning.
2. For the next researcher, the venturimeter instruments can be developed again by using a 3-foot monometer.

#### REFERENCES

- [1] Afriyanto, E ., 2015. Development of Learning Media for Instruments to BiotSavart Principle Material at SMAN 1 PrambananKlaten ", JRKPF UAD. 2 (1): 20-24.
- [2] Agustianti, Dara. 2015. Development of Melde Teaching Aids as a High School Physics Learning Media. Proceedings of the National Seminar on Physics (E-Journal) SNF 4.
- [3] Derlina. 2016. The Effects of Visual Media and Creativity-Assisted Inquiry Training Learning Models on Students' Science Process Skills. Educational Horizon Journal. (2)
- [4] Turnip, Betty, Ida Wahyuni. 2016. The Effect of Inquiry Training Learning A Model Based on Just in Time Teaching for Problem Solving Skills. Journal of Education and Practice. 7 (15)
- [5] Sastrawati, Eka. Novallyan Devi. 2017. Development of Android-Based Interactive Learning Media for Understanding Trigonometry Concepts. International Journal of Education Research (IJER). 2: 72 - 76
- [6] Wulantri.2017. Development of Instruments for Electromagnetic Induction Material Physics.Lampung.Lampung State Islamic University.