3D page flip professional: Enhance of representation mathematical ability on linear equation in one variable

F Ferdianto, Setiyani, and D Nurulfatwa
Universitas Swadaya Gunung Jati Jl. Pemuda No 32 Cirebon 45131

E-mail: ferryunswagati@gmail.com

Abstract. The aims of this paper is to develop valid learning media and improve of mathematical representation ability on linear equation in one variable. The research method which has been used in this research is research and development, and it refers to the ADDIE model, it is acronym of (Analysis, Design, Development, Implementation, and Evaluation). The instrument that is used is an interview to saw sheets of student learning, sheets of validation, about test (pretest and posttest). Based on the analysis shows that media valid and from the results of the tests of media use 3d pageflip professional can enhance the ability of mathematical representation with the medium interpretation enhancement criteria.

1. Introduction
Now the development of science and technology advanced and encourages efforts to renewal to make use of the technology in learning process. In the era of this technology in Indonesia according, various publisher introduces themselves and participate in developing the quality of education through the issuance of a variety of technologies as a source of learning [1]. From the interview result towards the students and one of the teachers in SMPN 7 Cirebon, that students are still many difficulties in studies matter of linear equations one variable and unpleasant because in learning mathematics still had not maximize media uses learning in some hate mathematics. Whereas in fact, mathematics is one of the sciences that contribute a lot in everyday life, that the contribution is given by mathematics starting from results simple like computational the basic calculation until a complex subject and abstractly such as the implementation of forth[2]. However, based on early research in the field, when the students doing the stories to in the model mathematics that is concerned with of linear equations one variable. Then, 20 students who do that situation, there were only 4 students who answered correctly and there were 5 students who did not give an answer, the rest answered but it was incorrect or incomplete, of the majority of students tend to do not understand from that situation. The difficulty is related to the ability of mathematical representation that is owned by students, so that can find out the problems that exist is students have difficulty representing real problems. One of the causes that make students difficult to understand mathematics is the teaching material used by students does not contain a level of representation so that multiple representations are not integrated with proportional learning [3].

The ability of representation to be one of the abilities that must be possessed by every student in learning mathematics. The ability of representation to be one of the abilities that must be possessed by every student in learning mathematics. Student's skill in using representation ability is important to know because it can be an evaluation of teacher performance [4]. Mathematical representation is the symbolization and modelling of mathematical concepts and relations contained in certain
configurations, constructions, or specific problem situations displayed by students in symbolic form as an attempt to get clarity of meaning, to show their understanding, or to find solutions to problems[5]. The teacher must be able to plan exercise instructions or reinforcement to consider how students can use representation in learning. The representation of teachers will also greatly influence students’, understanding and will be a representation of the concepts students have, if the representation of students can be visual, verbal, and mathematical [6]. Seeing the importance of interesting learning resources in the learning process and can guide a character of students, interactive media are expected to enhancing the learning spirit of students [7]. Learning media is a tool for delivering material to students during teaching and learning process and used as a learning resource such as textbooks [8]. Learning media is used as tool to facilitate and help the teacher’s work. Learning media is used to facilitate communication in the teaching and learning process, striving optimally to be able to foster creativity and motivation in learning activities to enhancing the quality of education [9]. Judging from the explanation of the use of instructional media, the function of learning media as information carriers or messenger of messages from the sender (teacher/educator) to the recipient (students) [10]. According Djamarah argues that the media plays a role in the learning process, because in this case the obscurity of the material presented can be helped by presenting the media as an intermediary [11]. Learning media is very helpful in the learning process besides learning media is made by having a characteristic to be able to arouse desires and generate motivation for students so that they can improve mathematical representation abilities. The media serves for purposes where the information contained in the media must involve students [12].

The reason why use 3D Professional Page Flip 1.7.6 is this software has the advantage that the resulting teaching material can be inserted in images, videos, animations, and simulations. The research method used is Research and Development and refers to the ADDIE model namely the acronyms from (Analysis, Design, Development, Implementation, and Evaluation). The instrument used was an interview sheet to determine student learning difficulties, validation sheets, test questions (pretest and posttest). The results of this study are learning media use 3D page flip professional enhance the ability of representation mathematical on linear equations one variable.

2. Method
The research method used is the development method. Development research is a research approach used by certain products, and test the effectiveness of these products [13]. This research adopts the development model of ADDIE. A development model consisting of five stages including analysis, design, development, implementation, and evaluation [14]. The development of media learning aims to maximize the role of media learning in schools that valid and can enhance students' mathematical representation abilities. The material in the learning media is a linear equation one variable.

The initial stages of this research are to conduct interviews with teachers and students, with the aim of knowing the problems and solutions for students. In addition, at this stage, analyzing what material will be included in this media is possible to be presented in the learning media. In the design stage are the initial design of the media or storyboard making and the preparation of materials and questions that will be made in the learning media using the Pageflip Professional 3D software. In the development stage, development is carried out which aims to assess whether the learning media made can be used or not, these stages are called learning media validation stages. In the validation phase, the learning media was distributed to 4 experts, namely, 2 media experts (lecturers), and 2 experts (lecturers and teachers). The media validation sheet is shown in table 1.

| The Form of Instrument Questionnaire | Indicator |
|-------------------------------------|-----------|
| Media Validation                    | Relevance |
|                                     | 1. Material relevant to the competence that |
must be mastered by students.
2. Problems in the media are relevant to the material presented.
3. Problems in the media in accordance with the ability of mathematical representation that must be mastered by students.

**Systematics dish**
1. The groove of matter in the media follows the flow of thought from simple to complex
2. Material presented coherently from beginning to end.
3. the contents of material easy to understand.
4. The use of language clear and comprehensible

**Compliance with the demand of student-centered learning.**
1. Encourage curiosity from students.
2. Encourage the interaction between students with the media presented.
3. Present a question contextual.
4. The contribution of students in solving a problem.

**Media Design**
1. Display on every pages interesting.
2. Transfer between pages/ place is clear (does not make confusion).
3. The text in a media clear and can be read.
4. Pictures and audio in a media clear.
5. No bug in the media.
6. Visible clear objectives on the media.
7. Information and orders in the media told clearly.
8. Video in the media is clear.

**Compatibility**
1. Media can be run on PC/ laptop and other devices.

In the next stage, the implementation stage is carried out to implement the learning system or media that we have created. This stage was conducted pretest and posttest, in which this process was carried out on one class in class VII Cirebon 7 Junior High School. This evaluation stage is the last stage of the ADDIE model, which is to see whether the learning system that is designed successfully matches the initial expectations or not.

The data collection methods and instruments in this study are quantitative data and qualitative data. Qualitative data is obtained in the form of analysis of the needs of educators and students, suggestions and comments from media experts, material experts through interviews and validation sheets. Quantitative data is obtained from the learning outcomes of students through pretest and posttest.

3. Results and discussion

3.1. Stages of Analysis

At this stage, it is done by analyzing the needs and then identifying the needs. This is the researcher gives a trial to students and interviews the teacher, to find out the difficulties, competencies, indicators
and learning objectives achieved by students. After knowing the information, the researcher identified the needs that would later be included in the learning media. Student analysis is carried out to determine the characteristics and learning styles of students obtained from the interviews with mathematics teachers and 30 students who explained in general that students still had many difficulties in learning PLSV material due to lack of understanding in the previous material, algebraic material. Learning is still centered on the teacher which causes some students to complain that learning mathematics is very difficult, and it is still rare to use instructional media that are suitable for learning indicators used in the media, in accordance with Core competencies (KI) and predetermined Basic Competencies (KD) that explain and solve problem that is related to the linear equation of one variable.

3.2. Design Stages
At this stage focused on various activities such as the initial compounding to make learning media products in the form of digital teaching materials. The explanation of each activity or step that existed at the design stage in this study.

3.2.1. Media Selection and Determination of Teaching Materials. Based on the results of the analysis, the media that will be selected are digital teaching materials or digital modules with professional 3D page flip-assisted as the main application and combined with other applications or software such as Ms. Office Word, iSpring Suite, Adobe Photoshop, Paint, Corel draw, Camtasia or Bendicam and other software to create learning media in the form of digital teaching materials or digital modules. For the determination of teaching material in this study selected material class VII junior high school in semester 1 is the material of linear equations of one variable which is a sub-section of the material chapter of linear equations and inequalities of one variable.

3.2.2. Making Media Design. The design of this initial media designs or drafts material on Ms. Office Word starts from the preface, concept map, content. In addition to making a cover or front cover and back cover of teaching materials using Adobe Photoshop. Meanwhile, to make pictures and video displays for short material that will be displayed in teaching materials or digital modules using paint and Bendicam. Product Making in this stage learning media in the form of digital teaching materials or digital modules begin to be made or arranged systematically into a professional page flip 3D application.

![Figure 1. Initial Display Learning Media](image.png)

The initial image of the module can be seen in the same picture in Figure 1 which when viewed Some buttons or navigation buttons are shown for the previous and subsequent pages, the exit button and several buttons are at the bottom of the learning media.
Figure 2. Media Usage Instructions. In the instructions for using this media, some important points are explained, and there are also instructions or information about any buttons or buttons that can be clicked.

Figure 3. List of Contents in learning media. In the learning media there is also a table of contents, and more interesting than the table of contents because it is designed so that the sub-sections contained in the table of contents can be clicked.

Figure 4. Video appearance media. There are several videos presented to attract students in learning, because there are videos about explaining the material in sequence and there are examples of problems.

Figure 5. Evaluation Problem Training. There are questions that are presented interactively, to enable students to learn independently without being accompanied by a teacher or tutor.
6. Author Biodata. In the learning media there is also a biodata of the author.

7. End View. The final view of the learning media uses a professional 3D pageflip on the material of linear equations of one variable to improve the ability of mathematical representation.

### 3.3. Development Stage

#### 3.3.1 Deployment Stage.

After learning media is created and designed to be interesting and can be used by students. Next is the deployment stage so that the media can be run at the laptop or other computer device stage. As for some specifications of a laptop or computer that will be used to run learning media in the form of teaching materials or digital modules.

| Hardware | Software |
|----------|----------|
| Computers with minimal processing Pentium IV 1 GHz, or AMD, equivalent VIA. Recommended Pentium Dual Core multimedia computer or equivalent. RAM capacity of at least 1 GB. Harddisk drive depends on the system operation used. Recommended 250 Gb and above. | The operating system used is a minimum of Windows 7, Windows 8.0 and Windows 8.1 and above are available plugins for Flash Player. *Flash Player version 10 and above* |

The first step in the deployment process is that after completing editing and creating learning media using professional 3D page flip is select and click on publish.
Figure 8. Publish or deployment of learning media. After that a new dialog box will appear, then select the EXE format for learning media products in the form of digital teaching materials or digital modules so that they can be opened and run on computer or laptop devices in other windows.

Figure 9. After selecting the .exe format, a new dialog box will appear to select the learning media storage place and give the name to the learning media product that will be stored.

Figure 10. In this dialog box can determine where the file will be saved and the name of the media that has been created, then can set or choose an icon from the media product and can create captions for the display under this learning media application icon. By selecting Advanced then selecting the icon that will be selected according to taste and write the caption that will be entered. After that click the icon ok then select convert.

3.3.2 Media Validation Results. The media was validated by 4 validators including 2 validators as media experts, 2 validators as material experts. Validation results are shown in Table 3.

| Table 3. Media validation results |
|----------------------------------|
| Validator | Validation Criteria |
| 1st       | 95 %                 |
| 2nd       | 93%                  |
| 3rd       | 93%                  |
| 4th       | 98%                  |

Validator 1 dan 2: Media Experts,
Validator 3 dan 4: Material Experts.
Table 3 shows that the assessment of the overall validator obtaining an average of 94.8% is included in a very valid criterion that the learning media can be used in learning for students who are highly capable or low-ability.

3.4. **Implementation Stage**
At this stage, the implementation of instructional media (implementation) has been declared to be feasible to be used for testing to students. At this stage, pretest and posttest were carried out on one class of students in class VII A of Cirebon 7 Junior High School. The study was conducted on 13 to 16 August 2018. The Pretest was carried out before students were given material by using instructional media, while posttest was conducted after students got the material using learning media.

3.5. **Evaluation Stage**
At the last stage is the evaluation stage, which is the stage of evaluating what students get after using the learning media and knowing how effective the learning media has been made.

From the results of the study, the results of the learning media validation assessment were obtained by 4 validators, by obtaining the criteria of very high validation values shown from the average percentage of 94.8%. With the level of validation, it is stated that the learning media created by the researcher is very valid and feasible to be used for testing on users.

Efforts to enhance mathematical representation capabilities are assisted with learning media using 3D PageFlip Professional which is appropriate in the implementation of classroom learning. Based on the calculation in the pretest and posttest, there is a gain value obtained is 0.43 according to normalized gain criteria in the medium category. This shows that the learning media using 3D PageFlip Professional which is developed effectively and feasible to use in mathematics learning. This shows that the learning media using 3D PageFlip Professional which is developed effectively and feasible to use in mathematics learning.

So that the media can be assessed and used by students to learn independently without guidance by the teacher or a tutor. That one media that is considered effective, efficient is an electronic module so that students can learn independently without being dependent on the presence of the teacher. This is consistent with research conducted by Suryani, et al (2015) entitled Development of Interactive Digital Text Books For Understanding the Concept of Geography, interactive digital textbooks created using the developed 3D PageFlip proved valid and based on empirical tests there was an enhancing[15].

4. **Conclusion**
The results of the study on learning media using 3D PageFlip Professional on the material 1 linear standard equation to improve mathematical representation ability, obtained the following conclusions:
(1) The results of the feasibility test to the expert obtained an average overall percentage was 94.8% with a very valid interpretation. This shows that the learning media using 3D Pageflip Professional which is suitable for use in mathematics learning; (2) Enhancement of students' mathematical representation ability by using Pageflip Professional 3D learning media is significantly better than students getting ordinary learning, with an average pre-test of 25.59 increasing on an average post-test result of 58.66. The average N-Gain value is 0.43 with the medium category.

**References**
[1] Kritianto A, Mustaji, Susilowati, & Nuryati D W 2018 Developing Media Module Proposed to Editor in Editorial Division. IOP Conf. Series: Journal of Physics: Conf. Series 947 012054.
[2] Afriansyah dan Muna 2016 Peningkatan Kemampuan Pemahaman Matematis Siswa melalui Pembelajaran Kooperatif Teknik Kancing Gemerencing dan Number Head Together. Jurnal Pendidikan Matematika STKIP Garut. 8(3)
[3] Helsy I, Maryanah, Farida I, & Ramdhani M A 2017 Volta-Based Cells Materials Chemical
Multiple Representation to Improve Ability of Student Representation. International Conference on Mathematics and Science Education (ICMScE) IOP Conf. Series: Journal of Physics: Conf. Series 895

[4] Theasy Y, Wiyanto, dan Sujarwata 2018 Multi-Representation ability of students on the problem solving physics. International Conference on Mathematics and Science Education. IOP Conf. Series: Journal of Physics: Conf. Series 983

[5] Hau R R H, Marwoto P, dan Putra N M D 2018 Pattern of mathematic representation ability in magnetic electricity Problem. International Conference on Mathematics and Science Education. IOP Conf. Series: Journal of Physics: Conf. Series 983

[6] Anam R S, Widodo A, & Sopandi W 2017 Representation of Elementary School Teachers on Concept of Heat Transfer. International Conference on Mathematics and Science Education. IOP Conf. Series: Journal of Physics: Conf. Series 895

[7] Anggraini R, Davina Y, Amir H, Murtiani M, & Yulkifli Y 2018 Electronic Module Design With Scientifically Character-Charged Approach on Klinematics Material Learning To Improve Holistic Competence of High School Students In 10th Grade. IOP Conf. Series: Materials Science and Engineering 335

[8] Saputra M, Abidin T F, Ansari B I, dan Hidayat M 2018 The feasibility of Android-based pocketbook as mathematics learning media in senior high school. South East Asia Design Research International Conference(SEA-DR IC). IOP Conf. Series: Journal of Physics: Conf. Series 1088

[9] Wiana W 2018 Interactive Multimedia-Based Animation: A Study of Effectiveness on Fashion Design Technology Learning. IOP Conf. Series: Journal of Physics: Conf. Series 953

[10] Daryanto 2010 Media Pembelajaran: perannya sangat penting dalam mencapai tujuan pembelajaran (Yogyakarta: Penerbit Gava Media)

[11] Risnawati, Amir Z, & Novita S 2018 The Development Of Learning Media Based On Visual, Auditory, And Kinesthetic (VAK) Approach To Facilitate Students’ Mathematical Understanding. Journal of Physics: Conference Series 1028

[12] Zainiyati, Husniyatus S 2017 Pengembangan Media Pembelajaran Berbasis ICT Konsep dan Aplikasi pada Pembelajaran Pendidikan Agama Islam. Jakarta: Penerbit Kencana.

[13] Ghozi, S 2014 Pengembangan Materi Mobile Learning Dalam Pembelajaran Matematika Kelas X SMA Perguruan Cikini Kertas Nusantara Berau. Indonesia Digital Journal of Mathematics and Education 1(1)

[14] Prawiradilaga D S 2012 Wawasan Teknologi Pendidikan (Jakarta: Kencana)

[15] Suryani N, Ruhimat M, & Ningrum E 2015 Pengembangan Buku Teks Digital Interaktif Untuk Pemahaman Konsep Geografi. Jurnal Pendidikan Geografi 15(2) 46