APTEKINDO 2018

by Erma Yulia

Submission date: 12-Jun-2023 03:25PM (UTC+0700)
Submission ID: 2114349323
File name: APTEKINDO_2018.pdf (45.29M)
Word count: 10090
Character count: 61618

PROCEEDINGS

International Conference
Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018

Theme:
"Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0"

Surabaya, 11-14 July 2018

Speakers:

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Minister of Education and Culture, Republic of Indonesia

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Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to Indonesia, ASEAN and Timor-Leste (Jerman)

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Faculty of Engineering
Universitas Negeri Surabaya
2018

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Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018

Theme:

"Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0"

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ISBN 978-602-449-160-4

PREFACE

All praises be to Allah SWT, so that the 2018 International Conference of ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia*** **(APTEKINDO)** could be held in Surabaya during 11-14 July 2018. APTEKINDO International Conference isconducted biennially in which this year host is Faculty of Engineering, State University of Surabaya. Therewere sixteen colleges attending this year Conference, most of which were former Institutes of Teacher's Education (LPTK).

This year theme is *"Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0"* aimed to respond to the development and acceleration of the industrial revolution 4.0 that has become the most discussed issues inmany countries. Industrial revolution connects machines with internet systems. In regard to facing such phenomena, Indonesian government through the Ministry of Industry has launched "Making Indonesia 4.0", of whichthe program focuses on industries that are driving the development of the industrial revolution 4.0 such as food and beverages, electronics, automotive, textiles and chemicals. To achieve better results of the program actualization, vocational education helps to prepare compatible and competitive workers for the areas of the aforementioned industries. Henceforth, numbers of Conferences, conventions, and meetings amongIndonesian practitioners in FPTK / FT-JPTK need to be held to initiate ideas in strengthening the role of LPTK within industrial revolution 4.0 era.

The Conference's proceedings contain 121 research papers and ideas that are relevant to the following nine sub-themes: *Technical and Vocational Teacher Competencies, Technical and Vocational Education Curricula, Technical and Vocational Education Models, Technical and Vocational Education Evaluation, Technical and Vocational Education Policy, Public-private Partnership in Technical and Vocational Education, Technical and Vocational Education Management, Technopreneurship*, and *Competencies Certification.*

Finally, all the committees send their gratitude to the participating speakers and all parties who support the run of the Conference. They also apologize for any inconvenience and wish a better undertaking event next year.

WELCOMING SPEECH RECTOR UNESA

Conference and Convention

Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (Aptekindo) 2018

Rich Palace Hotel Surabaya, 11-14 Juli 2018

Assalammu'alaikum Warahmatullahi Wabarakatuh.

Respectable Head of Universities, members of APTEKINDO
Distinguished Keynote speakers
Honorable authors, and fellow participants of APTEKINDO Conference and Convention 2018

Alhamdullilah, first of all, let us express our gratitude to Allah SWT because of his grace and blessings, we are able to attend this international Conference and convention of the Indonesia Association of Technology and Vocational Education or ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia*(APTEKINDO)** held in Surabaya, 11-14 July 2018.

This international and national Conference is conducted biennially as a routine agenda held by Association of Technology and Vocational Educationor *Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia* (APTEKINDO), which consists of 16 different universities throughout Indonesia. We would like to thank for the opportunity given to Universitas Negeri Surabaya for hosting this year event.

In the raise of industrial revolution, Conferences, gatherings, and sharing of knowledge play an important meaning in supporting the acceleration of innovative science and technology. Therefore, this Conference's theme is ***"Revitalization ofTechnical and Vocational Education to Face Industrial Revolution 4.0".*** This is an interesting and challenging topic not only for academic researchers but also for stakeholders and industry owners.

Ladies and gentlemen,
Since 2011, the industrial sector has been integrated with the online system known as industrial revolution 4.0. The first industrial revolution was marked by the use of steam engines to replace human and animal power. The second stage of the revolution was marked by the utilization of electrical power and the concept of mass production. Furthermore, the application of automation technology brought the industrial revolution to its third stage. Tremendous revolution happened when information and communication technology was introduced and fully utilized in industrial area, of which the condition brought the world in the fourth stage of the industrial revolution. The utilization of this technology changed not only the production process, but also across the industrial chains that result in a new digital-based business model which can achieve higher efficiency and better quality in industrial products. The consequences of this revolution are the increase of production efficiency as well as changes in the employment prerequisite. There is an increasing demand for new manpower, whilst the machines are replacing the role of workers. This condition leads to the importance of a new and more advanced method of preparing human resources that are ready to compete in the industrial revolution.

Ladies and gentlemen, in regard to prepare Indonesian human resource in facing the era of media convergence, there are at least two aspects that need our attention, namely the quality of human resources in accordance with the requirement of the digital-based industry and the equal distribution of qualified human resources especially in suburban and urban areas. Both aspects could be meant as a challenge and an opportunity for the higher education especially technology and vocational education to innovate and harmonize curriculum that connects with the industry. Thus, this Conferences becomes a perfect momentum for technology and vocational education to join and strengthen steps in preparing graduates that are ready to compete in the industrial revolution 4.0. Therefore, by starting with **"*Bismillahirrahmanirrahim*" The Conference and Convention of Association of Technology and Vocational Education or APTEKINDO 2018, is officially started"**

Ladies and gentlemen, we would like to thank the keynote speakers who are willing to attend and share knowledge in today's Conference:

1. Prof. Dr. Muhadjir Effendy, MAP.Minister of Education and Culture, Republic of Indonesia
2. Michael Freiherr Von Ungern–Sternberg, ***Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to Indonesia, ASEAN and Timor-Leste.***
3. Prof. Dr. Wenny Rahayu, *La Trobe University Victoria* **(Australia)**
4. Prof. Dr. Muchlas Samani, M.Pd., *Rector Universitas Negeri Surabaya (2010-2014).*

We also would like to thank the authors and all participants of the convention who have participated and contributed to sharing the knowledge and ideas. Hopefully, what we share and get here today can give benefits and contribute to improve a competitive atmosphere in Indonesia, Aamiin YRA.

Surabaya, July 2018
Universitas Negeri Surabaya
Rektor,

Prof. Dr. Warsono, M.S.

WELCOME SPEECH BY THE DEAN OF FACULTY OF ENGINEERING

at the International Conference and National Convention of

***AsosiasiPendidikanTeknologidanKejuruan Indonesia* (APTEKINDO) 2018**

Rich Palace Hotel, 12 July 2018

Assalamu'alaikum Warahmatullahi Wabarakatuh.

His Excellency, Rector of Universitas Negeri Surabaya
Respectable the Head of Universities asthe members of APTEKINDO
Distinguished Keynote Speakers
Honorable authors and Participants

Alhamdullilahirobbil alamiin. Thanks God. First of all, let us express our gratitude to Allah SWT because of his grace and blessings we are able to attend the 9th International Conference and convention of ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia* (APTEKINDO)** and the 19th workshop of the Technology and Vocational Education forFPTK/FT/FTK-JPTK in Indonesia. It is an honor for us, the Faculty of Engineering, Universitas Negeri Surabaya, to host this yearConference and convention.

On behalf of *Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia* (APTEKINDO),wewould like to welcome keynote speakers, authors, delegates and participants from technology and vocational education to the city of heroes, Surabaya.

Today, we meet in Surabaya to attend a biennial agendanamed APTEKINDO International Conference and Convention and National Workshop of the FPTK/FT/FTK-JPTK. Following the mandate from the 2016 APTEKINDO Convention in Medan, this year's Conference is held in Surabaya hosted by the Faculty of Engineering, Universitas Negeri Surabaya.

Ladies and Gentlemen, the theme of this year Conference is "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*". The theme is chosen due to the fact that we have to quickly respond and act accordingly to the effects of the industrial revolution on vocational education. Well-programmed and structured effortsshould be undertaken to ensure if technology and vocational education canproduce globally competitive graduates especially for industrial revolution era.

Numbers of important topics for technology and vocational education are discussed in this Conference. Thetopics includeTechnical and Vocational Teacher Competencies, Technical and Vocational Education Curricula, Technical and Vocational Education Models, Technical and Vocational Education Evaluation, Technical and Vocational Education Policy, Public-private Partnership in Technical and Vocational Education, Technical and Vocational Education Management, Technopreneurship, and Competence Certification.

Today's Conference has several outcomes. The accepted articles will be submitted for proceeding publication indexed by Atlantic Press. Meanwhile, the rejected articles by Atlantic Press will be published in the International Proceedings with International Standard Book Number (ISBN). Moreover, the articles written in Bahasa Indonesia will be published in the National Proceedings with ISBN.

Ladies and Gentleman, this meeting must be meaningful as a venue to communicate among researchers, academics, and members of FPTK / FT / FTK-JPTK from different universities as well as from related industries. By this regular Conference and convention, we can make a strong communication network and create innovative breakthrough and substantial blueprint of different aspects such as institutional quality, field study, and curriculum. We hope that this forum plays an important role in developing technology and vocational education to face the industrial revolution 4.0.

Finally, we would like to thank the organizing committee led by Mr.Tri Wrahatnolo, M.Pd., M.T., who gave an extraordinary support. Moreover, we would like to express our appreciation and gratitude to the members of steering committee from various regions in Indonesia, delegates, SC and OC members, sponsors, as well as personal or institutional support that make this event well-organized. I apologize if there are shortcomings from my part.

Good luck with the Conference of Indonesian Association of Technology and Vocational Education, APTEKINDO 2018, and wish the best improvement for technology and vocational education in Indonesia. Thank you.

Wassalammu'alaikum Warahmatullahi Wabarakatuh

CHAIRMAN'S SPEECH

at the International Conference and National Convention of

***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia* (APTEKINDO) 2018**

Rich Palace Hotel, 11-14 July 2018

Assalammu'alaikum Warahmatullahi Wabarakatuh.

His Excellency, Rector of Universitas Negeri Surabaya,
Respectable the Head of Universities, members of Aptekindo, Keynote speakers, Authors, and fellow participants of Aptekindo Conference and convention 2018.

Alhamdulillah, no words could represent the feelings but the gratitude of the presence of Allah SWT, for His blessings, so that we can attend APTEKINDO Conference with the theme "*Revitalization ofTechnical and Vocational Education to Face Industrial Revolution 4.0*".

In this pleased occasion, we would like to welcome all keynote speakers, authors, and participants of the Conference to this city of heroes, the city of heroic histories, Surabaya. We would like also to welcome to APTEKINDO 2018 Conference and convention held at the Rich Palace Hotel Surabaya, 11-14 July 2018.

The theme of this year Conference is "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0.*". This theme is chosen to respond to the development and acceleration of industrial revolution 4.0 that has been impactful in various countries. This industrial revolution has connected the utilization of machines to an internet system. To face such phenomena, Indonesian government through the Ministry of Industryhas launched a program called "Making Indonesia 4.0". Currently, the government is focusing on industries that support the development of the industrial revolution such as food and beverage, electronics industry, automotive, textile and clothing, and chemical industries.

In addition, vocational education plays an important role in preparing competent and competitive human resources. That is, Faculty of Technical and Vocational Education or *Fakultas Pendidikan Teknik dan Kejuruan* (FPTK) in Indonesia aims to compile excellent ideas and vision, which later could be shared through Conferences, conventions or meetings, and also be useful to encounter industrial revolution 4.0.

Today's Conference will present competent keynote speakers in the field of technology and vocational education, who are:

1. Prof. Dr. Muhadjir Effendy, MAP. Minister of Education and Culture, Republic of Indonesia
2. Michael Freiherr Von Ungern–Sternberg, Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to Indonesia, ASEAN and Timor-Leste.
2. Prof. Dr. Wenny Rahayu, La Trobe University Victoria (Australia)
3. Prof. Dr. Muchlas Samani, M.Pd., Rector of Universitas Negeri Surabaya (2010-2014).

In addition, I would like to point out that there are 602 participants from 17 different universities participating in today's Conference involving:

1. Universitas Palangka Raya
2. Universitas Gorontalo
3. Universitas Islam Negeri Ar Raniry Aceh
4. Universitas Negeri Solo
5. Universitas Negeri Menado
6. Universitas Pendidikan Ganesha
7. Universitas Nusa Cendana
8. Universitas Malang
9. Universitas Negeri Jakarta
10. Universitas Negeri Padang
11. Universitas Negeri Yogyakarta
12. Universitas Pendidikan Indonesia
13. Universitas Negeri Makassar
14. Universitas Negeri Semarang
15. Universitas Negeri Medan
16. Universitas Negeri Surabaya
17. Universitas PGRI Adi Buana Surabaya

There are 491 articles submitted to this Conferences covering papers and posters. 76 articles were accepted to Atlantic Press, 156 articles published in international proceedings with ISBN, dan 129 articles published in the national proceedings with ISBN. All articles will be available for an online access through the Atlantis Press official website and through APTEKINDO 2018 website.

Today's Conference isactually held with the helps and good cooperation of various parties. Therefore, we would like to express our gratitude to the Minister of Research, Technology and Higher Education, Rector of Universitas Negeri Surabaya, keynote speakers, participants, sponsors, and other stakeholders for the supports. We also send our highest appreciation to the committees who have worked hard to succeed this Conference.

At last, we hope that all participants get benefitsand knowledge that can contribute to reinforce vocational education and technology in facing the industrial revolution 4.0. WELCOME TO APTEKINDO CONFERENCE AND CONVENTION 2018, Thank you.

TABLE OF CONTENT

Sub Theme 3: Technology and Vocational Education Model (TVEModel)

The Modules Development of Material Testing by Using Constructivist Approach at Mechanical Engineering Department of UNIMED

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Abstract*— This research aims to develop the material testing modules by using constructivist approach at mechanical engineering department of State University of Medan (Unimed). The methode used was Research and Development Approaching Methode (R & D) by Borg and Gall. The model development phases for the studies referred to the development model of Dick and Carey, consisting of need analyse phase, development phase and evaluation phase. Data collection technique was performed through observations, questionnaires and objectivity tests. The result of reaserch and development was modules of material testing by using constructivist approach. The modules validity was determined by having some experts' validations, one to one evaluations and small group evaluations. The results of reaserch showed that the expert validity giving an average rating of 89,08 %, one to one evaluation was 87,03% average and small group evaluation was 89,09% average, this showed that the reaserch was valid to be used. The effectiveness of study was obtained from pretest and post test which was conducted at field trial, and proved the increasing of study results i;e 86,22% The research and development delivered good implications to the improvement of students' instructional outcomes who were taking material testing at mechanical engineering department of Unimed.

Keywords : modules, material testing, constructivist, mechanical engineering

I. INTRODUCTION

The colleges need to creatively develop the new instructional process more comprehensive to improve the skills of the learners. Conceptually the development of instructional materials is the means for universities to provide and broaden the insights of learning about knowledge, skills and other basic values with expectation it can be reflected in the ways of thinking and acting. This is relevant to the research conducted by Mursid (2009), entitled " Model Development of Learning Practice based Competency with Production Oriented in Mechanical Engineering Study Program ", Journal of Educational Technology UNJ.

Instructional process in colleges that applied lecturer of Mechanical Engineering Departement of Unimed has not shown as an effective instructional, where the Instructional process that is applied in the subject of material testing is classical instructional.

The weakness of classical instructional forces all students to study the same instructional materials at the same rate. Learners with higher learning ability will wait for other students, so they difficult to explore theirs ability and ultimately individual learning ability is not optimal. In order to learners' learning ability to the maximum can be done by providing materials and a series of tasks by using the module so that learners can learn independently at home. On that basis this module was developed by using constructivist approach tailored to the learning objectives

One form of instructional materials are modules. The term modules is a complete measurement tool, an independently functioning unit, separately, but also can serve as an overall unity of other units. The modules also means "is a free-standing, self-contained component of an instructional system (Heinich et al., 2007).

The module is a unit of planned instructional program, designed to help learners achieve instructional objectives, (Hermawan et al, 2010: 7).

From the description above it can be concluded that the module is a unit consisting of a series of instructional activities systematically arranged to help learners achieve the objectives that have been formulated with effective results, or simply be said that the module is a packaged curriculum is provided for students to learn independent.

Each module contains at least the subject matter, a matter of practice and test capabilities.

Alternative approach to instructional that can be apply is constructivist where learners construct their own knowledge in mind both individually and with friends (discussion).

Constructivist is a philosophical school that holds the view that the knowledge we have is the result of construction or form of ourselves, so that will be able to build and improve the knowledge of learners.

The form of instructional strategy that is considered complying with constructivist is a instructional strategy of Problem Based Learning (PBL). Refer to Hmlo Silver et. al (2013) that problem based learning is a learner centered pedagogical approach in which students engage in goal directed inquiry. In PBL, students work collaboratively to learn through solving complex and ill structured problems.

Development of learning materials requires a model as a reference for developmental steps. Popular models used in the development of learning materials, including Model Assure, Model ADDIE, Model PPSI, Model Banathy, Model Kemp, Dick and Carey Model. As a reference, this research used Dick and Carey Model whose stages of development consisted of identifying stage, developing stage and evaluation phase.

This research aimed to (1) know the validity of material testing modules by using constructivist approach at mechanical engineering department of Unimed; (2) know the effectiveness of material testing modules by using constructivist approach at mechanical engineering department of Unimed.

II. METHOD

This research was conducted on Mechanical Engineering Department of Unimed. The method used in this research was the Research and Development (R & D) approach by Borg and Gall (2007) which started that R & D method was used to design new products and procedures to meet the criteria of effectiveness, quality and standardized .

This research started with requirement analysis by collecting information about current condition of instructional process of material testing and information of ideal condition of instructional needed by students. Information was obtained through observation activities, questionnaire distributions, and focused group discussion (FGD) involving students and lecturers of material testing,. All information obtained was applied as data used for the next steps.

The steps of developing the material testing modules referred to the Dick and Carey Model consisting of 8 (eight) steps (Carey and Carey, 2009): (1) identifying the instructional needs and formulating the TIU; (2) performing the instructional analysis (3) identification of the initial characteristics of the students, (4)formulating the purpose of special instructional (TIK) , (5) determining benchmark of test reference, (6) developing instructional strategy, (7) developing instructional materials, (8) conducting formative evaluation. This formative evaluation was done after the draft of result of product development was completed. Formative evaluation began by conducting validation by experts, namely: 2 (two) instructional design experts, 2 (two) instructional material experts, and 2 (two) experts of instructional media.

The revised draft product after validating by experts, continued with one to one evaluation on 3 students, followed by revisions and then small group evaluation on 12 students. The next step was to perform field trials on 30 students, as the last step of the evaluation phase.

III. RESULTS AND DISCUSSION

The results of research were presented in 2 parts, namely : (1) the validity of material testing modules by using constructivist approach at mechanical engineering department of Unimed; (2) the effectiveness of material testing modules by using constructivist approach at mechanical engineering department of Unimed.

Validity of Material Testing Modules

The validity of material testing modules development results could be found out from experts' validations, one to one evaluation and small group evaluation. Instrument of data collections to find out the validity of model was using questioners.

Experts' validations, this stage involved three (3) areas of experts instructional design experts, instructional material experts and media learning experts. The results of data analysis taken from the experts' validations showed that the design expert of the study giving an average rating of 87,70%, the material expert giving an average rating of 89,30%, and the instructional media expert giving an average grade of 90,25%. The results of reaserch showed that the expert validity giving an average rating of 89,08 %,

One to one evaluation, this evaluation involved three (3) students who had high , medium and low academic abilities. The results of the assessment provided in the one to one evaluation was 87.03% average.

Small group evaluation, this test involved twelve students where four students had low academic abilities, four students had medium academic abilities, and four students had high academic abilities. The analysis of data obtained from this kind of small group evaluation was at 89.09% average.

The results of experts' validations, one to one test and the small group test proved that the modules of the development result was valid to be implemented.

Effectiveness Material Testing Modules

To know the effectiveness of the modules developed was by collecting data through a field trial test involving thirty students. The data were obtained through a class

observation which was conditioned based on the same the actual condition. Field trial started from pre-test followed by presentation of modules using contuctivist approach and ended with post-test. The effectiveness of modules of development results was done by comparing the pre-test and post-test results.

Based on the calculation of the average pre-test value was 45,63 and the average post-test was 85,77. The results of pre-test and post-test showed the increasing incurred by 40,14 or 87.97%. It meant that there was an increasing of instructional outcomes during the instructional process of material testing study by using a contuctivist approach as applied. The use of material testing modules, proved to be effective in increasing students' knowledge and insights based on the increasing of post-test values.

DISCUSSION

A instructional design should be in line between the instructional objectives and needs analysis. If instructional objectives are not based on needs analysis, a very high qualified instructional will not give any advantages for the students. Vice versa, if the needs analysis is not in accordance with the purpose of learning, the results of needs analysis does not reflect the purpose of instructional. This is in accordance with Anderson's and Krathwohl's opinions (2015).

The results of this research indicated that quality improvement and instructional process in universities need to creatively develop new educational concepts that are more comprehensive and competitive. This can be done with the renewal of a more flexible instructional approach, by placing the students as the subject rather than as the object of instructional. Therefore, the development of instructional materials conducted on the material testing study is appropriate and can be used as a reference in the development of instructional models for other studies.

Instructional objectives are the abilities or skills (competencies) that are expected to be possessed by students after they perform a particular instructional process (Sanjaya: 2008: 110). Similarly, according to Munthe (2009), "where the competency is the ability of students to do something well as a result of the process of instructional or education that followed".

The facts on the ground show the development of material testing modules refers to theoretical competency by having affective, cognitive, and psychomotor aspects. The specific instructional objective is a reference for lecturers to develop benchmark of reference assessments, develop instructional trategies, develop instructional materials, and as a basis for selecting appropriate instructional media

The facts on the ground show that in the modules developed, the lecturers' instructional activities have performed reinforcement by explaining the benefits of material testing knowledge and skills. Basically the reinforcement is performed to provide the strengthening to students in order to have motivations and passion to follow the instructional activities.

Besides the instructional approach and learning strategy, an important factor for the success of instructional activities is media utilization. The process of instructional a process of communication requires media to deliver messages can be effectively accepted by students. Gerlach and Elly in Sanjaya (2015) stated "that the media included people, instructional materials, tools or activities that create conditions that enable students to acquire knowledge, skills, and attitudes of behavior".

The modules of material testing development outcomes are validated by the instructional media experts. According to the media expert of material testing textbook, the development results are feasible to be used in the instructional process. This is in line with the opinions of Smaldino, Loether, and Russell (2011) I;e "the text elements must consider the style or type of letters, size, spacing, and color. The visual elements presented in the instructional material were layout settings, color balance, readability, and interest".

Miarso (2007) in his book "Sowing the Seeds of Educational Technology", citing Wright's opinion, based on his study of a number of studies, identified seven (7) indicators that demonstrate effective instructional, namely (1) well organized lectures, (2) effective communication, (3) mastery and enthusiasm in the course (4) positive attitudes toward students, (5) giving test and fair value, (6) flexibility in teaching approach, (7) good student instructional outcomes. In line with these indicators, the development of material testing moduls has been effective and provides good instructional outcomes.

The final products are ; instructional text books of material testing, lecturers' manuals and students' manuals. These products have some advantages: (1) recorded as the first book about material testing compiled by following the steps of developing of the existing instructional model in Mechanical Engineering Department of Unimed; (2) modules are in accordance with the needs of students, graduate and users; (3) interesting and easy to understand in terms of color selection and display of illustrations of images, photographs, and tables; (4) train students to solve problems and think logically and systematically.

IV. CONCLUSION

Based on the research objectives and discussions on the research results that have been raised, then from this research and development , it can be concluded that:

1. The validity of the material testing modules by using constructivist approach has been valid to be implemented because it has been proved through the formative evaluation. The formative evaluation was performed by the instructional design experts, instructional material experts, and media instructional experts. Next step is to perform a validity test by having a one to one evaluation and small group evaluation. Each stage always held revisions to product result of material testing modules development.

2. The effectiveness of material testing modules of the developed result was known by performing pre-test and post-test on field trial. The results of pre-test and post-test showed an increasing of students' instructional outcomes of 86,22%. It can be a proof that the material testing modules developed by constructivist approach has been effective.

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