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"Ethics in High-Quality Research"

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Yogyakarta, Indonesia, 6-7 May 2015

Rector,

Prof. Dr. Rochmat Wahab, M.Pd., M.A.
ID 19570110 198403 1 002

Head of
Institute of Research and Community Services,

Prof. Dr. Anik Ghufron, M.Pd.
ID 19621111 198803 1 001

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Edited by
Prof. Dr. Sri Atun,
Christopher Drake,
Dr. Elizabeth Hatnell-Young,
Dr. Mohamed Bahaaeldin
Prof. Dr. Sudji Mudadi,
Dr. Ing. Satoto Endar Nayoro, S., M.Eng., M.Sc.,
Retna Hidayah, ST., MT, Ph.D.,
Dr. Setya Raharja,
Dr. Widiyanto,
Dr. Arif Rohman,
Apri Nuryanto, MT.

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MESSAGE FROM THE RECTOR OF YOGYAKARTA STATE UNIVERSITY

Welcome to Yogyakarta, Indonesia!

It is a great honor and pleasure for me to welcome you all to the 3rd International Conference on Educational Research and Innovation held in Yogyakarta, Indonesia. On behalf of Yogyakarta State University and the committee, let me extend my warmest greetings and appreciation to all speakers and participants who have travelled hundreds or even thousands of miles by various transportation means to come to Yogyakarta to attend this conference. It is my strong belief that your safe journey has been due to the blessings granted by God the Almighty and the Most Merciful to Whom we without any further due have to express our gratitude and praise.

It is indeed a privilege for Yogyakarta State University to have the opportunity to organise this very important conference in which educational researchers and practitioners get together to share ideas, experiences, expectations, and research findings. This conference is held as one of the agendas of Yogyakarta State University to celebrate its 51st anniversary. The theme of this year's conference is "Ethics in High-Quality Research".

Research is one of the activities among the academic members of a university. It is a systematic effort to solve the problems or answer the questions by collecting data, formulating the generalities based on the data, then finding and developing organized knowledge by scientific method. It is expected that from research activities valuable empirical facts can be obtained to improve and develop the theory and practice to bring a better quality of education.

Unfortunately, currently issues on ethics are regaining their popularity in various practices of research, such as inaccurate data analyses, data manipulations, and plagiarsm. In response to this, in this year to support the roles of the Institute of Research and Community Services of Yogyakarta State University in encouraging researchers to conduct high-quality researches, an International Conference on Educational Research and Innovation (ICERI) is held under the umbrella theme of Ethics in High-Quality Research. It provides teachers/lecturers, education practitioners, college students, and policy makers the opportunity to share their knowledge, experiences, and research findings which are innovative and relevant to develop the educational practices focusing on the process and product.

This third conference is aimed at discussing the papers on the research findings related to research ethics, and researches on character education, teaching innovations, as well as educational policies. It is expected that this conference will reach its declared objectives succeesfully as a strategic forum to yield recommendations on the importance of ethics in the research to produce high-quality research for the benefits of the human's welfare.

To conclude, let me wish you a fruitful discussion during the conference and an enjoyable stay in Yogyakarta. And finally, hopefully all materials in this conference compiled into a proceeding are useful for us to improve the quality of education and educational research.

Thank you very much for your attention.

Wassalamu'alaikum warrahmatullah wabarakatuh.
May peace and God's blessings be upon you all

Yogyakarta, 6 May 2015
Rector,

Prof. Dr. Rochmat Wahab, M.Pd., M.A.

MESSAGE FROM THE ORGANIZING COMMITTEE

His Excellency Minister of Research and Technology and Higher Education,
Vice Rectors and Deans of all faculties,
Honourable Heads of Institutes of Research of the surrounding universities,
Distinguished all invited speakers and all other speakers,
Distinguished guests,
All participants,
Ladies and gentlemen,

Assalamu' alaikum warrahmatullah wabarakatuh
May peace and God' s blessings be upon you all
Good morning

First of all allow me to extend my warmest greetings and welcome to you all to the 3rd International Conference on Educational Research and Innovation, held by Yogyakarta State to celebrate its 51st anniversary.

Raising the theme – Ethics in High-Quality Research - this conference is designed to discuss the papers on the research findings related to research ethics, and researches on character education, teaching innovations, as well as educational policies. Hopefully, all discussions in this conference can be inspiring and useful for us to improve the quality of education and educational research.

Ladies and gentlemen

For your information, we will proudly present one keynote speech, four plenary presentation sessions and four parallel presentation sessions. Four outstanding speakers in the field of character education and educational research have been invited. They are Christopher Drake from Association for Living Values Education, Hong Kong, Dr. Elizabeth Hartnell-Young from Australian Council of Educational Research, Dr. Mohamed Bahaaeldin from Faculty of Education, Technische Universitat Dresden, Germany, and Dr. Nurul Taufiqurahman, Head of Innovation Center of the Indonesian Institute of Sciences (LIPI), Indonesia.

Ladies and gentlemen

We have done our best to prepare for this conference. So, my highest appreciation and heartfelt thanks to all committee members. As to err is human, shortcomings may

occur here and there. On behalf of the committee, I would therefore like you all to accept our apologies.

At the end of my speech,I would like to kindly request the Rector of Yogyakarta State University to officially open the conference.

To conclude, let me wish you a productive discussion and a fruitful conference.
Thank you very much for your attention.

Wassalamu' alaikum warrahmatullah wabarakatuh.
May peace and God' s blessings be upon you all

Yogyakarta, 6 May, 2015
Head of Research Institute and Community
Service of Yogyakarta State University

Prof. Dr. Anik Ghufron, M.Pd.

FOREWORDS FROM THE HEAD OF COMMITTEE

Assalamu'alaikum wa Rahmatullohi wa Barokatuh
May peace and God's blessings be upon us all

Your Excellency The President of Yogyakarta State University Prof. Dr. Rochmat Wahab, M.Pd, M.A, ladies and gentlemen, good morning and welcome to Yogyakarta State University.

The seminar entitle International Conference on Educational Research and Innovation (ICERI) is held under the umbrella theme of Ethics in High-Quality Research. The seminar is organized by Institute of Research and Community Services, Yogyakarta State University, working together with ACER, LIPI, and University of Dresden. This seminar also dedicated to celebrate the 51st Commemoration of Yogyakarta state university.

Ladies and gentlemen, on behalf of the commitee of this conference, I would like to express highest appreciation and gratitude to the keynote speakers **Prof. Drs. Muhammad Nasir, Akt, M.Si, Ph.D** (Minister of Research, Technology and Higher Education) and four inveted speaker :

- **Christopher Drake**
  (Association for Living Values Education, Hong Kong)
- **Dr. Elizabeth Hatnell-Young**
  (Australian Council for Educational Research, Australia)
- **Dr. Bahaaeldin Mohamed**
  (Faculty of Education, Technische Universitat Dresden, Germany)
- **Dr. Nurul Taufiqu Rahman, M.Eng.**
  (Head of Innovation Center, Indonesian Institute Sciences (LIPI), Indonesia)

The conference is around 200 participant with 121 orally presented article from lecture, researcher, teacher, and student from about 45 universities. The conference is aimed at discussing the papers on the research findings related to research ethics, and researches on character education, teaching innovations, as well as educational policies. It is expected that this conference yields recommendations on the importance of ethics in the research to produce high-quality research for the benefits of the human's welfare.

This conference will be far from succes and we could not accomplish what we do without the support from various parties. So let me extend my deepest gratitude and highest appreciation to all committee members. I would also like to thank each of participants for attending our conference and bringing your expertise to our gathering. Should you find any inconveniences and shortcomings, please accept my sincere apologies. In conclusion, I hope that your discussions produce something useful and very pleasant stay in Yogyakarta.

Wassalamu' alaikum wa Rahmatullohi wa Barokatuh
Thank you

Por. Dr. Sri Atun

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DEVELOPMENT OF ANDROID MOBILE GAME "THE PROFESSOR" AS CHEMISTRY LEARNING MEDIA IN SENIOR HIGH SCHOOL ON HYDROCARBON AND PETROLEUM

Paksi Manggala Putra[1], Jaslin Ikhsan[2]

[1,2]Department of Chemistry Education
Faculty of Mathematics and Natural Sciences, Yogyakarta State University
Karangmalang, Yogyakarta, Indonesia, 55281
[1]paksimanggalaputra@gmail.com, [2]jikhsan@uny.ac.id

Abstract

This development research was to develop android mobile game "The Professor" as chemistry learning media in senior high school on hydrocarbon and petroleum.The game "The Professor" was developed by using ADDIE (analyze, Design, Development, Implementation, and Evaluation) model. After the product was revised based on reviews and commentsfrom supervisor, an expert of subject matter, an expert of technology-information and multimedia, an expert of instructional design, and 3 peer reviewers, the product was evaluated and reviewed by 5 chemistry teachers.The mobile game "The Professor" on hydrocarbon and Petroleum well-developed and can be played on android smartphone. Teachers evaluated the game with average score of $\bar{X} = 108.4(\bar{X} > 105.1)$. Based on the statistic criteria, the score showeda very good quality of game withpercentage of ideality of 86.72%.

Keywords : Learning Media, Mobile Game, Android, Hydrocarbon and Petroleum, ADDIE

1. Introduction

Development in technology and science are rapidly bringing changes in human life. It impact to educational aspect, especially in the use of learning media.Learning media has important part in education system. According to Daryanto Learning mediais a toolwhich usedtofacilitatestudents to easily understand the learning material [1]. Media makecommunicationprocess between teacher and students becomeoptimal.Therefore, using good media are expected to achieve the learning objectives at school. The impact of using audiovisual resources on teaching and learning rests on the fact that the teachers stimulate interest and improve learning [2].

Media thatcanincreasemotivationandinterestthe learnersone of them isas a game [3]. Nowdays, smarthphone generaly used by people. The operating system on smartphones used by most people includes Symbian, Java, iOS, BlackBerry OS, and Android. Android is an operating system that is being widely used because of its excellence in providing a wide range of applications and games.

Based on observation in Purworejo Regency, most of student have mobile phone, but they only used it for send text messages, make a call, social media, and gaming. Whereas it can use for learning processespecially gamescalled "Game-Based Learning"

Digital Game-Based Learning is precisely about fun and engagement, and the coming together of and serious learning and interactive entertainment into a newly emerging and highly exciting medium [4]. Game-based learning (GBL) is a form of learner-centred learning that useselectronic games for educational purposes [5].

Therefore, it was necessary to make learning media that can simpifly the learning material. The research was to develop android mobile game as chemistry learning media on hydrocarbon and petroleum chapter. The mobile game was evaluated by 5 chemistry teacher to determine the quality of mobile game.

2. Literature Review

2.1. Research and Development

Research and development (R and D) is a method that used to result a certain product and to review the effectiveness of the product [6]. There are two models in research and development. They are conceptual model and procedural model [7].

2.2. ADDIE Model

ADDIE (Analyze, Design, Development, Implementation, Evaluation) model is one of procedural model in research and development. In this model, there are five phase to result certain product [8].

2.3. Learning Media

Learning media is something that used to deliver information between teacher and students [9]. According Gagne' and Briggs (1975) in Arsyad [10] stated that learning media includes physical tools that are used to deliver the subject and matter.

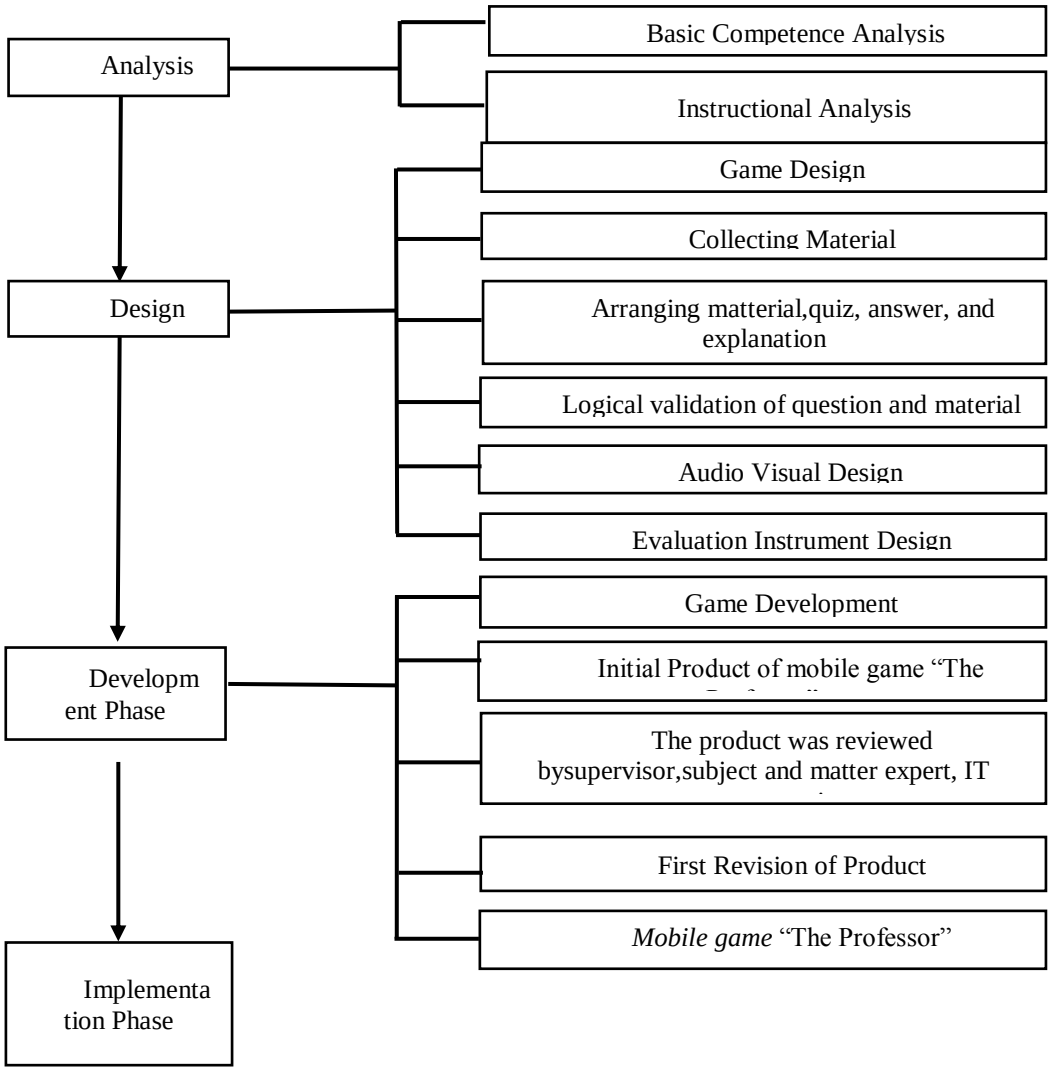
2.4. Chemistry Lesson

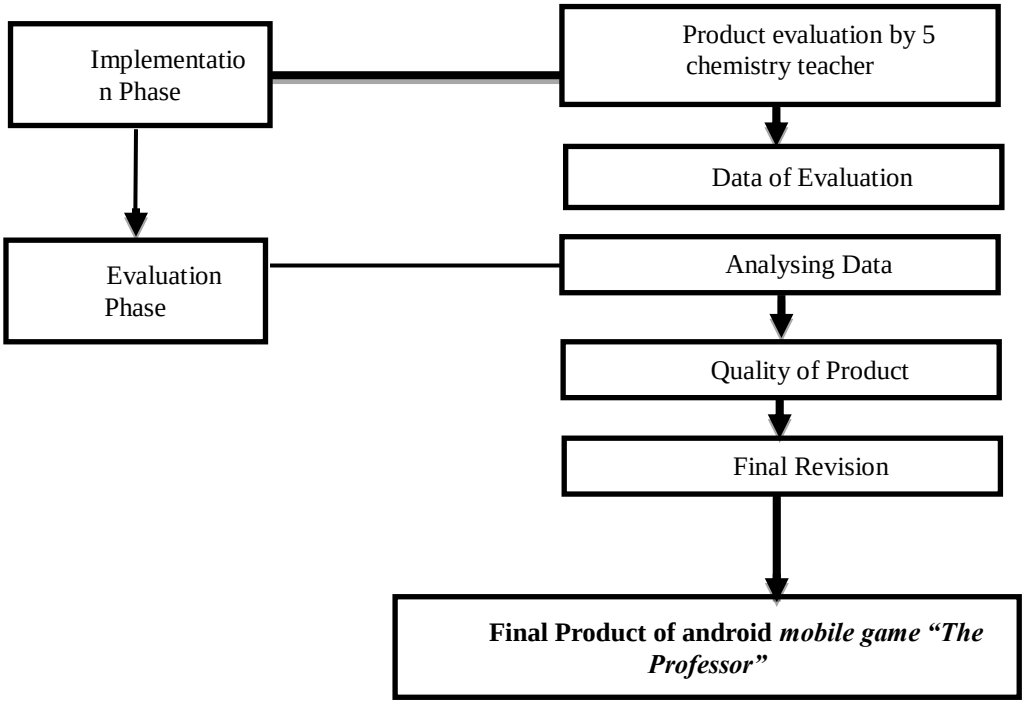
Chemistry is a branch of science that learn the chemical and its changing. Elements and solution are the component that include in chemical changing [11]

2.5. Game

Game (games) are each context between players that interact with each other to follow certain rules to achieve certain goals [12].

3. Diagram of research Design





4. Result

The mobile game was evaluated by 5 chemistry teachers. The aspect that evaluated were subject and matter aspect, language aspect, operational aspect, audio visualaspect, and software design aspect. The evaluation data of each aspect by teachers can be seen at Table 1.

Table 1. Evaluation Data By Teachers

No	Aspect	Average Score ($\bar{X}$)	Max Score
1.	Subject Matter	26	30
2.	Language	8.4	10
3.	Operational	17.4	20
4.	Audio and Visual	33.6	40
5.	Software design	23	25
Total Score		**108.4**	**125**

5. Discussion

The result of this research was the product of mobile game "The Professor". This mobile game was developed by using Construct 2 R178 program. The first product game was reviewed and commented by supervisor, an expert of subject matter, an expert of technology-information and multimedia, an expert of instructional design, and 3 peer reviewers. Then, the product was evaluated by 5 chemistry teachers.

f. Subject Matter Aspect

Subject matter aspect has 6 indicator of evaluation. Based on the data, the average score of subject and matter evaluation waswas$\bar{X}$=26 ($\bar{X}$>25.2). The maximum score of this aspect was 30. The criteria indicated that subject and matter aspects were very goodquality with percentage of ideality 86.7% It means that subject matter provided in the game was in line to the indicator of curriculum. It means that the subject matter in the game was good and appropriate as learning materials for students.

g. Language Aspect

There are 2 indicators in this aspect. The maximum score of this aspect was 10. Language aspect was evaluated by teachers and students. Based on teacher's evaluation, the average score of this aspect waswas$\bar{X}$=8.4 ($6.8 < \bar{X} \leq 8.4$), so the criteria suggest that language aspect is good with percentage of ideality 84%. Languagecategorized good if it was arranged by communicativesentence, using good and true Indonesian, does not causea doubleinterpretation, and does notoffendthe student [13].

h. Operational Aspect

There are 4 indicators in operational aspect. The maximum score of this aspect was 20. Based on the evaluation, the average score was $\bar{X}$=17.4 ($\bar{X}$> 16.8). Based on the criteria, it shows that operational aspect is very good, close to ideal learning criteria.

i. Audio Visual Aspect

There are 8 indicators in this aspect. The result of evaluation, the average score was 33.6. The maximum score of this aspect was 40. The criteria suggest that audio visual aspect is good, close to ideal learning criteria because the average score ($27.2 < \bar{X} \leq 33.6$).Based on criteria aspect audio visual has good quality with percentage of ideality 84%.

Software Design Aspect

Total indicator in this aspect was 5. The maximum score of this aspect was 25. Based on the evaluation, the average score of software design was 2, so based onthe criteria interpreted that software design aspect is very good, close to ideal learning criteria. Because the average score ($\bar{X}$> 21.0). This aspect get highest score than other aspect, because in software design aspect teachers and students assume that the mobile game is the new learning media that they have been never used before.

6. Conclusion

The mobile game "The Professor" was developed and easily used on Android mobile phone. The game was very good based the review of teachers. Based on teachers evaluation, the score of criteria was $\bar{X} = 108.4$ ($\bar{X} > 105.1$). The criteria suggest that the mobile game was very good, close to ideal learning criteria, as indicated by the ideal percentage of 86.72%.

REFERENCES

[1] Daryanto. (2010). *Media Pembelajaran.*Yogyakarta: PenerbitGava Media. P.7

[2] Ode, Elijah Ojowu. (2014). Impact of Audio-Visual (AVs) Resources on Teaching and Learning in Some Selected Private Secondary Schools InMakurdi. *IMPACT: International Journal of Research in Humanities, Arts, and Literature (IMPACT: IJRHAL)*, p. 195-202.

[3] Park, Hyungsung. (2012). Relationship between Motivation and Student's Activity on Educational Game.*International Journal of Grid and Distributed Computing*, p.101-114.

[4] Prensky, Marc. (2001). Digital Game-Based Learning. McGraw-Hill.pp.5

[5] Joubert, M. (2008). Examining the potential of game-based learning through the eyes of mathstrainee teachers*Proceedings of the British Society for Research into Learning Mathematics*. England: BSRLM.pp.120

[6] Sugiyono. (2010). *MetodePenelitianPendidikanPendekatanKuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta. pp.297

[7] Setyosari, Punaji. (2012). *MetodePenelitianPendidikandanPengembangan*. Jakarta: KencanaPrenada Media Group. pp. 221-223

[8] Padmo, Dewi. (2004). *TeknologiPembelajaran*. Jakarta: PusatTeknologiKomunikasidanInformasiPendidikan. pp. 418

[9] Daryanto.(2010).*Media Pembelajaran.*Yogyakarta: PenerbitGava Media. pp. 157

[10] Arsyad, Azhar. (2004). *Media Pembelajaran* (1 ed.). (M. E. Dr. Asfah Rahman, Penyunt.) Jakarta: PT RajaGrafindo Persada. pp.4-5

[11] Chang, Raymond. (2005). *Kimia Dasar: Konsep-konsepIntiJilid 1 EdisiKetiga*. (AlihBahasa: Departemen Kimia, InstitutTeknologi Bandung). Jakarta: Erlangga. pp.3

[12] Sadiman, Arief S, et.al. (2011). *Media Pendidikan Pengertian, Pengembangan, dan Pemanfaatannya*. Jakarta: Pustekkom dan PT RajaGrafindo Persada. pp.75-76

[13] Depdiknas. (2008*). PanduanPenulisanButirSoal*. Jakarta: Direktorat Pembinaan Sekolah MenengahAtas. pp.14

DEVELOPMENT OF 3-DIMENTION ILLUSTRATED TEXTBOOK AS ENRICHMENT MATERIALS FOR MADRASAH TSANAWIYAH STUDENTS

Slamet Harjono[1], Jaslin Ikhsan[2]
1 Postgraduate Program of Science Education Studies, Yogyakarta State University, Karangmalang, Yogyakarta
2 Department of Chemistry Education, Yogyakarta State University, Karangmalang, Yogyakarta
slametbangka1@gmail.com[1], jikhsan@uny.ac.id [2]

Abstract

Media has potential function on science learning. In the last five years, ICT-based media were developed in dramatic numbers and types, including ICT-based 3-dimention (3D) objects. The 3D objects related to science learning materials can assist significantly students on bringing tangibility of science phenomena. This research and development produced 3D objects which were used to complete the illustration of a textbook on the topic of scientific performance and motion of objects. To develop the model, the researcher followed 10 development stages adapted from Borg and Gall. The 3D objects were developed using the computer application of Google Sketchup with Augmented Reality Plugin. The 3D objects were linked to relevant marker that was inserted into related paragraphs on the textbook as illustration. When the marker on the textbook was captured by a digital camera of laptop, android smartphone (minimum OS 4.0.3), or other ones, the 3D object appeared obviously and interestingly. The 3D objects can be seen from different angels of observation as the need of learning. The 3D-illustrated textbook was successfully developed and reviewed by the expert of multimedia and instruction. It can be concluded that the media reached the criteria of good media as enrichment materials for students at Madrasah Tsanawiyah .

Keywords: ICT, media, 3-dimention objects, enrichment material, science learning.

1. Introduction

Quality of education in madrasah (Islamic schools) can be created properly by conducting instructional processes effectively, meaning that those processes can run smoothly, in a directed manner and in conformity with instructional objectives. Many factors affect instructional processes, either the students themselves or other factors such as the teacher, the facilities, as well as instructional media. Instructional media as means of improving the quality of education is crucial for those instructional processes.

Today's teachers are expected to master computer technology to help them complete their job. Teachers use computers to prepare instructional documents, process data for assessment as well as save various data sources and instructional media electronically. Using computers, teachers can create interesting instructional media in order to realize instructional objectives.

Development of media are intended to facilitate teachers in the instructional processes. Development of instructional media depends on the instructional objectives, instructional materials, ease of obtaining the necessary media as well as the ability of teachers to develop them during instructional processes. Innovative instructional media can now be presented in the form of 3-dimensional illustrations. These 3-dimensional illustrations are intended to bring the real world displayed through computers or android smartphones supported at least by OS 4.0.3.

The media being developed are instructional media in the form of supplementary textbooks with 3-dimensional illustrations. The use of such instructional media during instructional processes in the classroom supported by a computer/ laptop and a projector is expected to raise students' curiosity and critical-thinking skills. In addition to using a computer/ laptop and a projector, the supplementary textbooks with 3-dimensional illustrations are also designed to be used in conjunction with android smartphones supported at least by OS 4.0.3.

2. Literature Reviews

2.1 Instructional Media

Instructional media are one of the important components in instructional processes. The use

of instructional media is strongly recommended in order to make instructional processes between the teacher and students not boring and can stimulate activity, interest, and creativity of the students. Particular media are considered as instructional media if they are used to distribute or deliver messages for instructional purposes.

According to Reference [1], the definition of media has something to do with the giving/ passing of information (messages) between the source (the messange sender) and the recipient. Media are any forms and channels that can be used in a process of presenting information. Instructional media are any tools (aids) or objects that are used to deliver messages (information) from the source (either a teacher or other sources) to the recipient or the students.

Reference [2] writes that the term media comes from the Latin and is the plural form of the word medium which literally means an intermediary or introduction. Media are an intermediary between the sender and the recipient. Instructional media are anything that can be used to deliver a message from the sender to the recipient so as to stimulate minds, feelings, attention and interests of students in such a way that instructional processes occur.

Reference [3] writes that instructional media are all forms of information carriers which can be used to record, store, preserve, transmit, or retrieve information for purposes of teaching and learning. They are materials used by practising and trainee teachers to present, illustrate, and elucidate teaching posits.

Based on Reference [4], "...media are physical means which are used to send messages to the students and stimulate them to learn". Media are a means of communication which can be either printed or audiovisual. Good and interesting printed or audiovisual media are expected to stimulate the students' enthusiasm to learn.

According to Reference [5], "Media are the means for transmitting or delivering messages and in teaching-learning perspective delivering content to the learners, to achieve effective instruction".

Reference [6] states that "...instructional media are basically distribution systems, and the most critical consideration in selecting a medium is the preservation of instructional effectiveness".

Reference [7] says that media, in the broad sense, are humans, materials, or events which constitute conditions where students can successfully acquire necessary knowledge, skills, or attitudes. Teachers, textbooks and school environment are media. As for media in the teaching and learning processes, they are often defined as graphic, photographic or electronic devices to capture, process and rearrange visual or verbal information.

Instructional media synthesized from some experts are defined as all forms of information carriers which can be used to record, store, display, transfer, or retrieve information for effective teaching and learning processes.

2.2 Three-Dimensional Illustrated Textbook

Reference [8] writes that school textbooks can be classified into primary textbooks and supplementary textbooks. Primary textbooks are textbooks compiled by referring to the curriculum and are used by students and teachers as the primary source for teaching and learning processes. As for supplementary textbooks, they consist of any other reading materials that can be used to enrich students' learning skills and experience. Textbooks are a learning source which contributes substantially to an effort to expand educational opportunities while at the same time improving the quality of instructional processes and outcomes.

Supplementary textbooks are textbooks whose content supports the content of the primary textbooks. These textbooks are prepared to enrich, broaden and deepen students' knowledge and support the current curriculum. Supplementary textbooks may cover specific subjects of the curriculum but these subjects are discussed widely and deeply. These materials are necessary for students to better understand the concepts in the primary textbooks.

Development of supplementary textbooks with three-dimensional illustrations was supported by a number of supporting aspects, they are:

Augmented Reality

Reference [9] defines Augmented Reality as the incorporation of real and virtual objects in a real environment, running interactively in a real time and integrating objects in three dimensions, namely virtual objects which are integrated in the real world. The appropriate display technology enables the integration between real and virtual objects, interactivity is made possible through specific input devices, and good integration requires effective tracking.

Reference [10] in the book entitled Augmented Reality: A Practical Guide, defines that Augmented Reality is a natural way to explore 3D objects and data, AR is a concept which combines the virtual world and the real one. This makes two-dimensional (2D) or three-dimensional (3D) virtual objects look as if they

were real and fused with the real world. In Augmented Reality technology, users can see the real world around them with the addition of computer-generated virtual objects.

Reference [11] in the Handbook of Augmented Reality defines Augmented Reality as a live direct or indirect view of a physical, real-world environment improved/ added by adding computer-generated virtual world information. Augmented Reality is interactive and includes a 3D model and combines real and virtual objects. Augmented Reality is designed to simplify its users' life by bringing the virtual world information not only for the surrounding environment, but also for any direct views of the real-world environments, such as live video-streaming. AR improves its users' perception of and interaction with the real world.

Augmented Reality (AR) is a technology that combines two-dimensional or three-dimensional virtual objects into a real three-dimensional environment and projects those virtual objects in a real time.

b. Sketchup

Sketchup is a 3D modeling program designed for architects, civil engineers, film makers, game developers, and related professions. This application program is designed to be easier to use than other 3D programs. Files in Google SketchUp can be exported to various 3D formats with the following extensions: .3ds, .dae, .dwg, .dxf, .fbx, .obj, .xsi, and .wrl. including the format of Google Earth (.kmz). Google SketchUp can be used to save screenshots of an object into the following formats: .bmp, .png, .jpg and .tif.

ARmedia

AR-media is an Augmented Reality program developed by Inglobe Technologies named "AR-media Plugin". It is intended for the development of advanced Augmented Reality applications and solutions. This makes it possible to create solutions ranging from stand-alone, web and mobile as well as custom solutions to meet the complex needs of various scenario applications. To support different tracking techniques and software technologies in Augmented Reality, designed and used by Inglobe Technologies.

The necesary laptop/ computer hardware to run AR-media consists of:

The minimum hardware: 1 GHz processor, 512 MB RAM, 100% Compliant OpenGL Video Card with 128 MB RAM, 50 MB hard disk space, USB 2.0 Webcam

The recommended hardware: 2 GHz processor, 2 GB RAM, 100% Compliant OpenGL Video Card with 512 MB RAM, 50 MB hard disk space, USB 2.0 Webcam with 30fps @ 640x480 resolution.

Software: Microsoft Windows® XP/Vista/7/8, Video Driver, Android 4.0.3 or the latest version, DirectX103 or the latest version.

AR-media Player

The AR-media Player only uses some of the features of the AR-media platform. No specific skills are required to operate this AR-media Player. Complex and high quality of Augmented Reality can be displayed via the AR-media Player. Moreover, the AR-media Player can be used to view contents which have been created using the minimum android-smartphone version, i.e. version 4.0.3.

In short, three-dimensional illustrated textbook are textbooks used to enrich students' skills and experience with the addition of Augmented Reality to create the three-dimensional illustrations. Three-dimensional objects were created using Google SketchUp in which the Augmented Reality display was set using AR-plugin for SketchUp. The augmented reality made can be displayed using AR-media Player in laptops/ computers and android smartphones supported at least by version 4.0.3.

2.3 Curiosity

According to Reference [12], curiosity is most apparent in children who constantly explore their environment and frequently ask the question: Why? Curiosity is characteristic of scientists who often have many interest, even beyond that of unravelling the mysteries of natural phenomena.

Reference [13] writes that "Curiosity is broadly defined as a desire for acquiring new knowledge and new sensory experience that motivates exploratory behavior". Curiosity can be classified into two, namely perceptual curiosity and epistemic curiosity. The first is defined as a type of curiosity that leads to increased stimuli perception in animals and humans triggered by visual, auditory, or touch stimulation while the latter is defined as a stimulus to learning new things triggered by conceptual puzzles and gaps in knowledge.

Reference [14] writes that "Curiosity was conceptualized as a positive emotional-motivational system associated with the recognition, pursuit, and self-regulation of novelty and challenge". Curiosity is definitely a very pleasant experience. It makes people look for interest and desire that later will motivate them intrinsically.

Reference [15] writes that "... conceptualized curiosity as a reaction to novel

stimuli that involved feelings of interest or uncertainty". Curiosity is divided into epistemic curiosity and perceptual curiosity, which differ in terms of the type of stimulus activated, the emotional state and behavior triggered. The first is triggered by complex or conceptual ideas (e.g. scientific theories and intellectual puzzles) which encourage to ask a question or examine a hypothesis to gain knowledge. The latter is triggered by complex patterns or sensory stimulation (e.g. views and sounds) and motivated behavior such as visual inspection to obtain new information.

Reference [16] writes that there are four main attitudes necessary to be developed in science, namely: (a) curiosity, (b) inventiveness, (c) critical thinking, and (d) persistence. These four attitudes actually cannot be separated from one another as they are complementary. Curiosity encourages inventiveness in which if supported by critical thinking, it will strengthen persistence and dare to be different. Curiosity is indicated, among other things, by enthusiastically looking for answers, paying attention to the object under observation, feeling enthusiastic at processes of natural sciences and asking every step involved in an activity.

Reference [17] writes that "...curiosity as the threshold of desired uncertainty in the environment that leads to exploratory behavior". Spontaneous exploratory curiosity is a common method, but it requires critical factors, such as familiarity and stimulus characteristics. Curiosity is resulted from cognitive conflicts or gaps in knowledge arising from stimuli or situations.

Reference [18] writes that curiosity is one aspect that is conditional for student development. This is even the soul and essence of the learning culture. Without it, students will lose the motivation to learn and eventually will never learn. Instructional processes will be more interesting if such processes are accompanied by the will arising internally from the students themselves without any encouragement or coercion from others.

Reference [19] provides the definitions of real curiosity to students:

a. reacting positively to new, strange, odd, or mysterious elements in the environment which approach them through exploration and manipulation;
b. desire to know more about themselves and their environment;
c. scanning their environment to look for new experiences; and
d. continuously looking for and exploring stimuli to know more.

To put it in a nutshell, curiosity is the desire to acquire new knowledge which raises motivation and interest to make exploration. It is indicated, among other things, by enthusiastically looking for answers, paying attention to the object under observation, feeling enthusiastic at processes of natural sciences and asking every step involved in an activity.

2.4 Critical Thinking

Reference [20] states that critical thinking is the ability to solve problems; generate products which gain appreciations, which are flexible, creative, and original; thinking about an idea; finding the right path to achieve goals; capturing and transferring knowledge; as well as expressing views and feelings in an appropriate manner. Critical-thinking skills are not innate or natural in nature, but these skills can be taught and learned. Many people nowadays lack the ability to reflect on ideas and reexplain how to solve problems.

Reference [21] states that critical thinking always takes place in response to a particular task, question, problematic situation or challenge, including solving problems, evaluating theories, conducting inquiries, interpreting works, and engaging in creative task (Bailin 1990), and such challenges always arise in particular contexts. Dealing with these challenges in a critical way involves drawing on a complex array of understandings (what colleagues and I have termed intellectual resources), the particular resources needed for any challenge depending on the specific context.

Reference [22] states that one of the necessary skills to face the future challenges is the higher-order thinking skills which are often referred to as critical-thinking skills. These skills are related to the ability to identify, analyze and solve problems creatively and logically so as to result in the right consideration and decision. The 21st century skills include digital-age literacy (which consists of functional literacy, visual literacy, scientific literacy, technology literacy, information literacy, cultural literacy, and global awareness), creative thinking, higher-order thinking and sound reasoning, effective communication and high productivity.

Reference [23] defines critical thinking as "the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action". It is also known as metacognition, i.e. cognition

about cognition. Critical thinking skills are important because these skills allows students to effectively address social, scientific, and practical issues. The students who are able to think critically will manage to solve problems effectively.

Reference [24] states that critical thinking is the ability to use a set of intellectual abilities either in the context of problem solving, decision making or interactions with others. It is characterized by capabilities to debate and analyze arguments, assess credibility of particular sources, make inferences (drawing conclusions based on solid evidence and reason) and decide actions, as well as serve as disposition determining the critical spirit (what motivates critical thinkers to use their critical thinking skills in their own thinking and to think about others). Moreover, when thinking critically one is required to consciously and deliberately find and use knowledge and criteria related to the problem or question under consideration.

Reference [25] states that the best critical thinking skills are taught and assessed in individual subjects. Different materials consist of different types of arguments and criteria to verify the truth or credibility.

Critical thinking is not a skill that can evolve on its own as human physical development grows. It needs training through stimulus provision which requires one to think critically. Schools as an institution of education are responsible for helping students develop critical thinking skills.

The indicators of critical-thinking skills in Reference [16] are questioning the findings their peer reports, asking about any changes/ new things, repeating the activity they do and not ignoring every single data.

In short, critical thinking is the ability to use a set of intellectual abilities either in the context of problem solving, decision making or interactions with others. The indicators consist of questioning the findings their peer reports, asking about any changes/ new things, repeating the activity they do and not ignoring every single data.

3. Research Methods

This is developmental research which employs the method of research and development (R&D). The product to be developed here is an instructional medium, i.e. supplementary textbooks with three-dimensional illustration for natural science instruction for seventh graders related to the materials of scientific performance and the motion of objects. To display the three-dimensional illustrations needs computers or android smartphones which are supported at least by version 4.0.3. Without computers and smartphones as the aids, the resulting product will only serve a function as common textbooks like the others.

The development model used is the research-based development adapted from the model in reference [26] which comprises of ten steps: (1) collecting information (doing literature reviews, conducting classroom observations, designing a research framework); (2) designing the research including formulating the research objectives, estimating funding needs and the time required, as well as developing research procedures; (3) developing the initial product (designing the initial draft of the product); (4) conducting preliminary field testing; (5) revising the main product; (6) conducting maing field testing; (7) revising the results of the main field testing; (8) conducting operational field testing; (9) revising the final product; (10) disseminating and implementing the product.

The planned research steps in the development stage are described as follows:

1. Researching and Collecting Data

In this stage, the researcher conducted library research and field observations. The library research aims to look for theoretical concepts or foundations which support the product of the instructional media. Field observations are intended to obtain the real picture of the problems with science instruction in schools/ madrasah.

2. Planning

Based on the preliminary study that has been conducted, planning was made in relation to the product of the instructional media, which includes:

a. the purpose of the product utilization;

b. the users of the product; and

c. descriptions of the components of the product and its utilization

3. Developing the Initial Product

Initial product development is the rough draft of the instructional media product to be developed. Nevertheless, it has to be developed as completely and perfectly as possible.

4. Validating the Initial Product

The draft or the initial product was developed by the researcher and assistance from experts/ practitioners was asked according to their expertise. The validation process involved experts in media and materials, science teachers and peers. Results of this validation were used as guidelines in the first revision. The revised draft would be the second product to be tested on a limited basis.

5. Limited Testing for the Instructional Media

The initial product in the form of instructional media, i.e. supplementary textbooks with three-dimensional illustrations was tested on a limited basis to a small group. This aims to examine and measure these supplementary textbooks with three-dimensional illustrations during instructional processes in terms of their readability, clarity and usefulness.

6. Revising the Instructional Media

Results from the limited testing were used as guidelines in the second revision which later generated the main product. This main product was field-tested once more.

7. Field Testing

It was conducted in 2 groups, namely the control group and the experiment group. It aims to assess feasibility and effectiveness of the instructional media developed, i.e. supplementary textbooks with three-dimensional illustrations in relation to the curiosity and critical-thinking skills of MTs students.

8. Revising the Final Product of the Instructional Media

Results from the field testing were used as guidelines to revise and perfect the final product of the instructional media in the form of supplementary textbooks with three-dimensional illustrations.

9. The Final Product

It is necessary to perfect the final product greater to obtain a higher level of accuracy. In this stage, a product whose effectiveness can be ensured was finnally generated.

10. Limited Dissemination

In this stage, the product developed was distributed limited to schools/ madrasah where the testing was conducted.

4. Conclusions

Supplementary textbooks with three-dimensional illustrations have been successfully developed using SketchUp with AR-media Plugin displayed using AR-media Player. Using a laptop/ computer and an android smartphone supported at least by version 4.0.3, the illustrations of the three-dimensional objects represented by a marker in supplementary textbooks can be well displayed. The illustrations of the three-dimensional objects displayed can be seen from different points of view, by either rotating the marker or the camera.

A review of the multimedia and materials experts suggest that the instructional media in the form of supplementary textbooks with three-dimensional illustrations have met the criteria of being good media as enrichment materials for Madrasah Tsanawiyah students.. It is expected that the use of this instructional media in the form of supplementary textbooks with three-dimensional illustrations during the instructional activity will manage to raise the curiosity and critical-thinking skills of the students during the field testing.

REFERENCES

[1] Latuheru, J. D., "Media Pembelajaran Dalam Proses Belajar Mengajar Masa Kini.," Jakarta: Departemen Pendidikan dan Kebudayaan Direktur Jenderal Pendidikan Tinggi, 1988.

[2] Sadiman, A. S., Rahardjo, R., Haryono, A., Rahardjito, "Media Pendidikan: Pengertian, Pengembangan dan Pemanfaatannya," Jakarta: PT Raja Grafindo Persada, 2002.

[3] Onasanya, S. A., Selection and Utilization of Instructional Media for Effective Practice Teaching, Institute Journal of Studies in Education vol. II, 2004, pp.127-133.

[4] Nuhung Ruis, Muhyidin, Tri Waluyo, "Instructional Media," Jakarta: Ministry of National Education, 2009.

[5] Naz, A. A., Akbar, R.A., "Use of Media for Effective Instruction its Importance : Some Consideration," Journal of Elementary Education vol. XVIII, 2010, pp. 35-40.

[6] Holden, J.T., Westfall, P. J., Emeriti, C., "An Instructional Media Selection Guide for Distance Learning: Implication for Blended Learning Featuring an Introduction to Virtual Worlds.," United States of America: United States Distance Learning Association, 2010.

[7] Arsyad, A., "Media Pembelajaran," Jakarta: Rajawali Pers, 2014.

[8] Sitepu, B. P., Memilih Buku Pelajaran, Jurnal Pendidikan Penabur, vol. XIV, 2005, pp. 113-126.

[9] Azuma, R. T., "A Survey of Augmented Reality," Presence: Teleoperators and Virtual Environments, 1997, pp.355-385.

[10] Cawood, S., Fiala, M., "Augmented Reality A Practical Guide ," Texas: The Pragmatic Bookshelf, 2008.

[11] Furht, B., "Handbook of Augmented Reality," New York: Springer, 2011.

[12] Collette, A.T., Chiappetta, E.L., "Science Instruction in the Middle and Secondary Schools," New York: Macmillan Publishing Company, 1994.

[13] Litman, J. A., Spielberger, C. D., "Measuring Epistemic Curiosity and Its Diversive and

Specific Components," Journal of Personality Assessment, 80, 2003, pp. 75–86.

[14] Kashdan, T. B., Rose, P., Fincham, F. D., "Curiosity and Exploration: Facilitating Positive Subjective Experiences and Personal Growth Opportunities," Journal of Personality Assessment, 82, 2004, pp. 291-305.

[15] Collins, R. P., Litman, J. A., Spielberger, C. D., "The measurement of perceptual curiosity," Personality and Individual Differences, 36, 2004, pp. 1127–1141.

[16] Patta Bundu, "Penilaian Keterampilan Proses & Sikap Ilmiah Dalam Pembelajaran Siswa SD," Jakarta: Departemen Pendidikan Nasional Direktorat Jenderal Pendidikan Tinggi Direktorat Ketenagakerjaan, 2006

[17] Jirout, J., Klahr, D., "Children's scientific curiosity: In search of an operational definition of an elusive concept," Developmental Review, 32, 2012, pp. 125–160.

[18] N. D. Muldayanti., "Pembelajaran Biologi Model Stad Dan Tgt Ditinjau Dari Keingintahuan Dan Minat Belajar Siswa," Jurnal Pendidikan IPA Indonesia 2, 2013, pp. 12-17.

[19] Cohen, L., "Educational Research in Classrooms and Schools: A Manual of Materials and Methods," Londen: Harper & Row Ltd., 1976.

[20] Rozakis, L., "81 Fresh & Fun Critical-Thinking Activities," New York: Scholastic Professional Books, 1998.

[21] Bailin, S., "Critical thinking and science education," Science & Education, 11, 2002, pp. 361-375.

[22] Tinio, V.L., "ICT in Education," 2003. Accessible http://www.apdip.net/publications/iespprimers/ICTinEducation.pdf at August 2014, 18

[23] Snyder, L.G., Snyder, M.J., "Teaching Critical Thinking and Problem Solving Skills," The Delta Pi Epsilon Journal vol. I, 2008, pp. 90-99.

[24] Viera, R.M., Viera, C.T., Martins, I.P., "Critical thinking: Conceptual clarification and its importance in science education," Science Education International vol. 22, 2011, pp. 43-54.

[25] Brookhart, S.M., Nitko, A.J., "Assessment and Grading in Classrooms," New Jersey: Pearson Prentice Hall, 2008.

[26] Borg, W.R. & Gall, M.D., "Educational Research," New York: Longman, 1983.