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Constructing VMMSCCText for Re-conceptualizing Students' Conception

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ABSTRACT

VMMSCCText (Visual Multi-Media Supported Conceptual Change Text) has been constructed to represent the neutral object concept chance into more existent and meaningful learning. The key design of VMMSCCText is a combination computer that agrees users to explore the complete neutral object concept in relations of the present conceptual and applied. The aim of this study is to develop an established conceptual change text which can help lecturers related their students to change their misconceptions only by understanding a text. The ADDIE research model has been developed VMMSCCText, which contains the steps of: Analyzing, Design, Development, Implementation and Evaluation. The research was convoyed of the academic year 2016/2017 at the PGSD (Elementary Education in Indonesia Context) FKIP Universitas Riau. Based on data analysis, it can be determined that VMMSCCText could successfully increase understanding for re-conceptualizing about students' neutral object conceptions.
KEYWORDS: VMMSCCText; remediation; misconception; neutral object; elementary education.

I. INTRODUCTION

Teachers are keys in successful the quality of education because it is the spearhead in the field where they meet face-to-face to the student by scheduled and programmed. This opinion is supported by [1] which stated that the quality of the learning process is highly dependent on the quality of teachers in addition to facility factors. Teachers are fragment of the package as curriculum, textbooks, communiqués unit and newssheets [2]. Thus, a very strategic step towards improving the quality of education is an effort to improve the quality of teachers through the preparation of qualified teachers in the University. Identified substantial and major holes for successful use of the theoretic conceptions the pre-service teachers through their professional practice [3].

Through the earlier limited years, considerable determination has been positioned on educations of students' misconceptions in numerous physical subject substances. Students could treasure that selected physical concepts such as heat, electricity and magnetism are abstract, difficult, unclear and problematical.Several study were based on misconceptions of some physical concepts: the concept of static electricity [4], electric circuit [5, 6], force and motion [7], heat and temperature [8, 9], Newton Laws [10] and magnetism concept [11, 12].

Misconceptions are resistant to the new ideas and more scientific, even students holding misconceptions will reject the new idea received [13] so it is difficult for them to embed a scientific conception, in the end that will ultimately hinder the achievement of a full understanding of teaching materials.

Prospective primary teachers' misconceptions should not be allowed and must be eliminated immediately. If it is not immediately remedied, they will bring the misconceptions until they become teachers and will effect to their students. Changing the misconception has been firmly entrenched in the mind of the students that is more difficult than inculcating a new concept, because they are not realizing that they got misconceptions. Like a psychoneurotic would never feel that they have mental disorder. Misconception is a person having misconceptions (error concept) will not feel that he is wrong; even he has high confidence in the truth of his concept. Surely it will be difficult to correct a misconception when the person himself feels no error.

It needs a special strategy to turn a misconception into a scientific concept. The approach often used is known as the conceptual change approach. One of the strategies widely used in conceptual change is the cognitive conflict strategy [14]. This strategy holds that it is difficult to change the misconception because the person does not feel wrong, and then there is no other way but by undermining the level of belief in the wrong concept. Through the decreasing of the belief in the wrong conception, expecting that he will soon realize that there are mistakes in his

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concept. In cognitive conflict strategies, to decrease the level of students' belief in their concepts, conventional confrontation is typically processed by confronting the concept with reality according to the scientific concept. The usual technique used is that they are asked to perform a direct observation of phenomena contrary to their concepts. The situations of conflict in their minds (disequilibrium state) are expected to occur by knowing what they see while observing is contrary to their current concept. When this situation has happened it will be easier to change their wrong concept into a scientific concept. Cognitive conflict strategies are developed based on constructivism [15].

In practice, cognitive conflict strategies are applied in the conceptual change model (CCM). There are four essential conditions for changing the concepts: 1) dissatisfaction with current concepts (dissatisfaction), 2) introducing of new intelligible concepts (intelligible), 3) new concepts introduced must be reasonable (plausible) and 4) new concepts introduced must be clearly fruitful (fruitful) [16]. Developed CCM based on constructivism consisting of six process steps following: 1. the process of disclosing the students' concept on an occasion or physical phenomenon; 2. The disclosure of the belief level of the students' concepts; 3 [17]. Confrontation the student's belief through observation of real phenomena; 4. Scientific explanation process to help students accommodate new scientific concepts; 5. Strengthening and expansion process of concepts; and 6. Searching process of new ideas in accordance with the concept accommodated [15, 18].

CCM can be used to remedial teaching activities. Remedial teaching is important after regular teaching, as stated above that teaching can be a cause of misconceptions among students. Remedial teaching can be done with face-to-face learning mode in the classroom or by giving the students reading material (text) of changing concept mode that can be read and learned by their own selves.

One of the choices techniques for eliminating misconceptions is using computer supported instructional materials in classroom [19]. Computer supported instructional ingredients provides students to study with their speeds, facilitate learning, and gives prospects to replication the course contents out of school. Courses controlled with computer supported instructional materials would be sustained by pictures, videos, virtual experiment environments, animations, etc., [20, 21, and 22]. Using computers in classrooms have also effects on students' effective learning.

Then, around is a crucial for a considerable which can restructure learners' conceptual constructions. This considerable need be basically presented then basically presented besides essential profit from preceding understanding of the students. However the usage of this substantial, learner must understand both old and new understandings on an exact foundation. Established the conceptual change texts (CCT) by implementing the step of the conceptual change principle recommended [23, 24, 25]. CCT purposes at facilitating students to transformation their misconceptions to scientific knowledge. Step in CCText concluded question or interrogations to the significant personalities thru the determination of detection their present misconceptions (dissatisfaction), encounter towards remaining misconceptions by using analogies (intelligibility), contribute the correct meanings of the perceptions (plausibility) and offer new situations for relating the new perception (fruitfulness) [23]. Several other researchers have deliberated on the CCText since the education of Roth. Several educations e.g. [24, 26, 27, 28, 29, 30] roughly the CCText and physics concepts. Basically, premeditated on the CCText by relating them to the traditional texts (TT) in physics besides current the texts in their studies [24]. This guides that here is not sufficient suggestion demonstration that CCText are more operational or effective in reorganize the misconceptions. Is VMMSCCText able to change student misconception into scientific conception on neutral object concept? Based on the research-background, we have been developing a Visual Multi-Media Supported Conceptual Change Text (VMMSCCText) since 2016 [31, 32, 33, 34, 36]. This study aims to improve a confirmed conceptual change text which can help lecturer attendant their learners to reorganize their misconceptions only by reading a text.

II. MATERIALS AND METHODS

A. Material

Is the technique of developing the outline or design had established an authority. This basic that at this step everything needed or that would support the learning exercise would have been successful organized. As sketch of the design, the development step has been organized based on scheme VMMSCCText as the following.

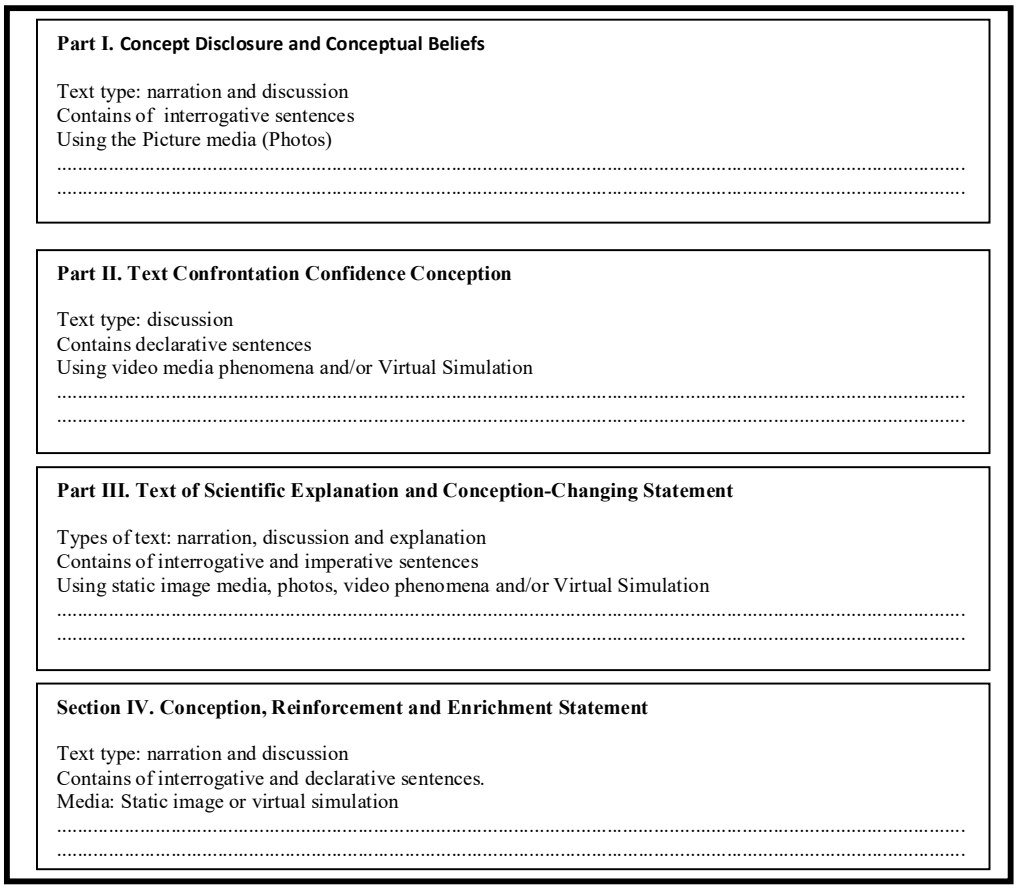


Figure 1. Design VMMSCCText

To categorize [33] assert of learner dilacerated on FTT (four-tier test) consequences, the data analysis as presented in table 1.

Table 1. The Category of Students' Conceptions concluded FTT (four-tier test)

No	Category	Combination of answers			
		Tier 1 **Option**	***Tier II*** **The first Confidence Rating Scale**	***Tier III*** **Reasons**	***Tier IV*** **The Second confidence Rating Scale**
	SK	Correct	Sure	Correct	Sure
	LK	Correct	Sure	Correct	Not Sure
		Correct	Sure	Incorrect	Not Sure
		Correct	Not Sure	Correct	Sure
		Correct	Not Sure	Correct	Not Sure
		Correct	Not Sure	Incorrect	Not Sure
		Incorrect	Sure	Correct	Not Sure
		Incorrect	Sure	Incorrect	Not Sure
		Incorrect	Not Sure	Correct	Not Sure
		Incorrect	Not Sure	Incorrect	Not Sure
	M	Correct	Sure	Incorrect	Sure
		Correct	Not Sure	Incorrect	Sure
		Incorrect	Sure	Incorrect	Sure
		Incorrect	Not Sure	Incorrect	Sure
	E	Incorrect	Sure	Correct	Sure
		Incorrect	Not Sure	Correct	Sure

Note: SK, LK, M and E stand for Scientific Knowledge, Lack of Knowledge, Misconception and Error

B. **Methods**

The ADDIE model of research approaches has been developed to improve Visual Multi-Media Supported Conceptual Change Text (VMMSCCText), which contains the steps of: Analyzing, Design, Development, Implementation and Evaluation. The development of VMMSCCText concluded ADDIE model has been useful to the students'; as therefore the students were able to be recognized hold the current concept. The research was convoyed of the academic year 2016/2017 at PGSD (Pre-Service Elementary Teacher) FKIP Universitas Riau.

The improvement of Visual Multi-Media Supported Conceptual Change Text (VMMSCCText) on the neutral object concepts is emphasizing on the conceptual approach to re-conceptualize students' more effusively understanding the concepts. Moreover, VMMSCCText improvement will be argued as follows.

A. ***Analizing***

The analyzing step was a development of needs calculation such the step to categorize the research problems (needs) and to accomplish tasks' analyze. The productivity of the analyzed procedure was more prominence on conceptual teaching concluded the use of multimedia computer. Grounded on further analysis, investigators have been found the development of VMMSCCText. Analyzing step were also directed by "SAP" or learning plan and syllabus of basic concept of science at that moment researchers completely conducted an ultimate revision of the "SAP" and the current syllabus. The "SAP" and syllabus have been established based on a conceptual approach concluded a VMMSCCText. With the reality of a fundamental modification of the curriculum and syllabus, the analyzing method produced the developing VMMSCCText publicized more highlighting on the concept of a neutral object.

B. ***Design***

This step was well-known as constructing blue-print [33, 34, 35], alike with the construction before it was made there would be a design on paper. Design in interrogation is the design of VMMSCCText used in learning. VMMSCCText design idea concentrated by static electricity concept specifically in the main concept of neutral object via simulations, figure and videos. This VMMSCCText was designed by science concepts such as; atoms, static electricity and matter. An example of a multimedia design developed in VMMSCCText in the form of storyboards is presented in Fig 1 and 2.

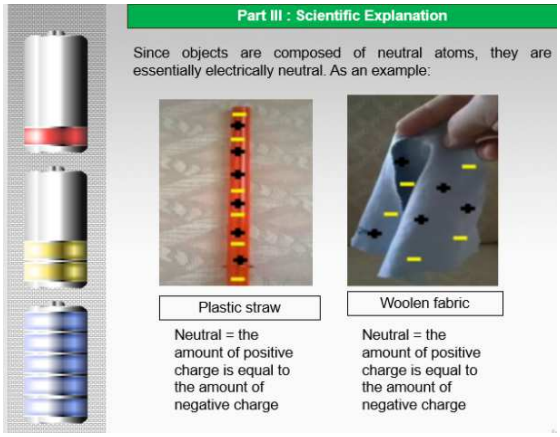


Figure 2.An Example of VMMSCCText

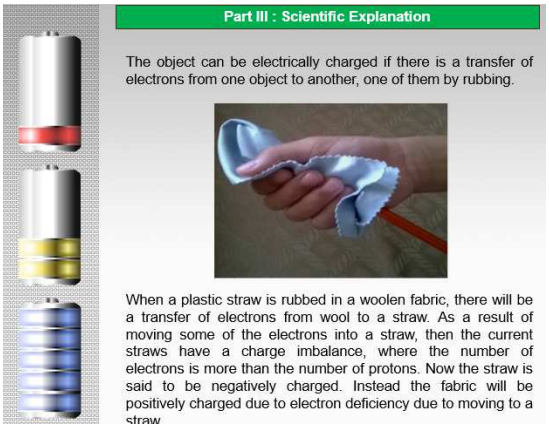


Figure 3.An Example of VMMSCCText

C. *Development*

Development step was the practice of recognizing the design or scheme had become a reality. The resources that at this step all needed or that would maintenance the learning procedure would have been well organized. As an sample of the design, the improvement step has been arranged based on multimedia form as the following sample:

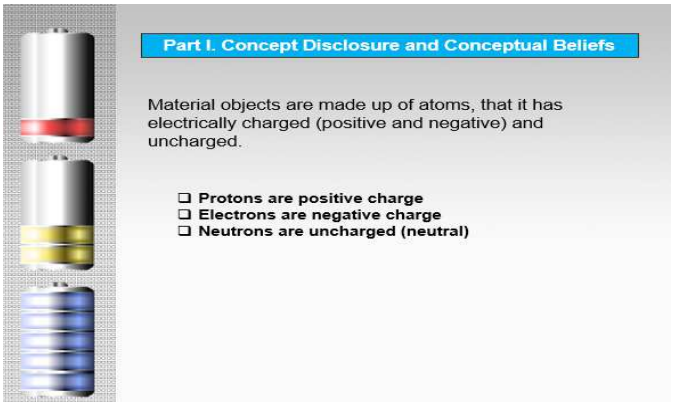


Figure 4.An Example of VMMSCCText (Part I)

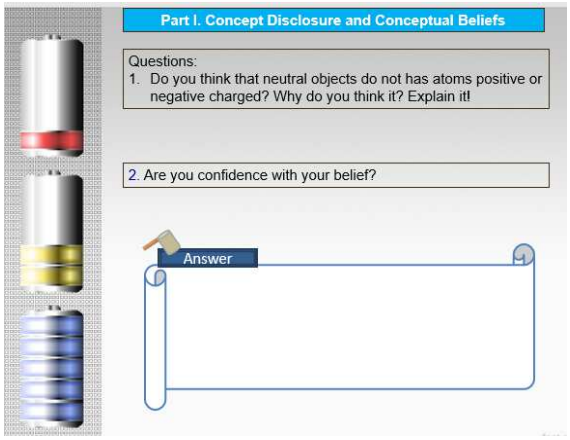
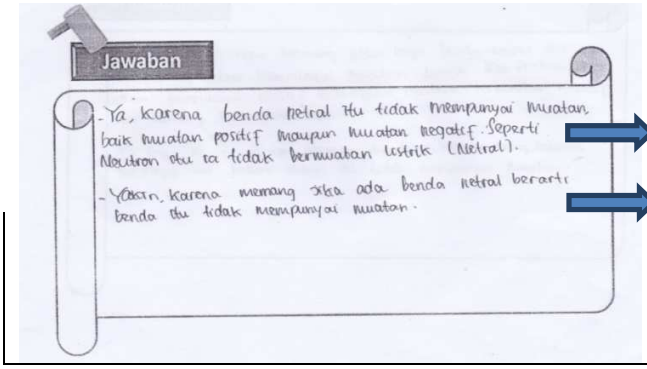


Figure 5. An Example questions' VMMSCCText



Answer

Yes, because neutral object doesn't have electrical charge event positive or negative charge. As like neutron is unchanged (neutral)

Sure, Because neutral object is unchanged

Figure 6. An Example students' answer VMMSCCText

The development was accepted connecting the improvement design and VMMSCCText contented. VMMSCCText scheme that was developed consuming the program Flash MX and Java Applet were individually developed by the researchers and here remained also used Physics Education Technology (PhET) Simulation and others.

D. ***Implementation***

Implementation was the existent step to appliance a learning method that was being shaped. At this step altogether that has been established was installed or set in such a way applicable to the part or function to be applied. Once the produce was ready, self-educated education then re-evaluated and revised so as to create a final product that was ready to be distributed. But at the preliminary design VMMSCCText was only done on a minor group trial and evaluation. Here was sample of the application of the VMMSCCText in Basic Science Concept.

Figure 7.The Implementation VMMSCCText

E. ***Evaluation***

Evaluation was the procedure of education to understanding whether the structure was actuality created effectively, discussing to primary expectations or not. Evaluation step was intellectual to be carried out at every of the four steps over the thought determinative evaluation, because this step characteristic was estimated in applying process. For sample in the application step desired accomplished evaluations to give feedback to the exhausted from the tap that was being completed.

III. RESULT AND DISCUSSION

This can be appreciated in the use of parts of VMMSCCText could be used at home and in the classroom. In adding, VMMSCCText was also charity as a concentration on the learning activities in the precedingstep. Table 2 displayed the amount of students in both formal of conception earlier to the VMMSCCText activity and whose misconceptions were remediated when the VMMSCCText activity shares to the concept of Neutral Objects.

Table 2. Quantity of students on any state of conception earlier to VMMSCCText activity and whose misconceptions are remediated when VMMSCCText activity

Concept	Quantity of students on any state of conception prior to VMMSCCText (%)			Quantity of students whose misconceptions are remediated after VMMSCCText activity (%)	
	SC	M	LK		
Neutral Objects	00.00	71.43	28.57	96.00	4.00
Total	0	25	10	24	1

In the table elsewhere it accomplishes that in the initial situations of VMMSCCText activity, first, an insignificant percentage of students require had a scientific conception, ultimate of them sensitivity misconceptions and practically incomplete are in a correct of lack of knowledge. Advanced contributing in VMMSCCText activities completely student's (96.00%) suffering misconceptions on the concept of Neutral Objects can be remediated. This endorses that the use of VMMSCCText in the teaching of basic science concepts can advantage the conceptual change of all students'undertaking misconceptions.

It funds that the VMMSCCText might effectively increase the education process on neutral object conceptions and the equal time the ideal could re-conceptualize the students' conceptions. This is reinforced by research conducted by Hermita et. al [31, 32, 33, 34, 36], the VMMSCCText can increase learning progression and CCText supported virtual simulation very effectively to remediate misconceptions [21].

IV. CONCLUSSION

Recognized on the breakdown data, it can be determined that the improvement of VMMSCCText on the neutral object finished ADDIE emerging model (Analyzing, Design, Development, Implementation and Evaluation) was able to successfully increase the student's understanding on neutral object.

V. RECOMMENDATION

Based on conclusion and research findings, they are recommendation for next research:

1. VMMSCCText product is used to basic of science program lecturers' in PGSD Program PGSD (Pre-Service Elementary Teacher) for remediate teaching.
2. VMMSCCText can be developed in another science contents rich remediate teaching in basic concept of science lecture.
3. VMMSCCText needs to be developed and provided in visual media.

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