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Hydrocarbon Compounds Learning Application

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Abstract—Hydrocarbons are the simplest class of carbon compounds. Hydrocarbons consist only of the elements carbon (C) and hydrogen (H). Although it only consists of two elements, hydrocarbons are a large compound. It is also one of the most important sources of energy on earth. The main use is as a fuel source. In its solid form, hydrocarbons are one of the asphalt-forming compositions. By seeing the importance of learning hydrocarbons, we made a mobile application to facilitate student learning. There are some learning material about hydrocarbon. User are confronted with hydrocarbon compounds and they are asked to answer the compound's name. User also opposed with a hydrocarbon's name and they are asked to draw the compounds.

Index Terms—hydrocarbons, mobile application, compounds.

I. INTRODUCTION

There are three hydrocarbon compounds, namely alkanes, alkenes, and alkynes. These are a simple hydrocarbon chains with no functional groups. Alkanes are hydrocarbons where carbon chains consist of only a single bonds. Alkenes are unsaturated aliphatic hydrocarbons with a double bond between carbon atoms. Alkynes are also unsaturated hydrocarbons that has a triple bond. Researches on hydrocarbon's learning application shows that it enriches the learning resources [1] [2].

In this research, we propose an application that contain material about hydrocarbon. Moreover, there are some questions in order to facilitate learning in the form of guessing names and guessing pictures. To guess the name, the opposite applies where the application provides a picture, then students answer by choosing the given choice. To guess the picture, the application provides the name of the compound, then students draw the compound with the drag and drop feature.

II. LITERATURE REVIEW

A. Mobile Application for Learning

Mobile applications tend to bring valuable results to learning in challenging learning environments [3] [4]. Farrah's research shows that most students use mobile applications because of the ease of accessibility and flexibility that helps them in the teaching and learning process.

Moreover, Sulisw_oro and Maulana combine cooperative learning and mobile technology. This system was developed to enable teachers to organize learning more effectively. The results showed that both technically and application play roles, it means that the application of cooperative learning can be used to increase student interest in learning [5] [6].

B. Learning Application of Hydrocarbon

Student learning can be improved with instructional media that use models. For hydrocarbon compounds, the use of ball-and-stick models can improve student performance in naming and using structural hydrocarbon formulas that form part of the IUPAC nomenclature concept [7].

Other research that had been done are modelling hydrocarbons compound using augmented reality. This facility has a very good criteria to use as learning resources [1]. Chiu was also doing research in chemical compound via augmented reality. She found out there are three advantages to using ARs: First, ARs can help students to visualize unseen structures and enable them to arrange compounds from different perspectives; secondly, this helps students learn without the teacher and outside the classroom; and finally, students' perceptions about mobile phones have changed from mere communication devices to learning tools [2].

III. APPLICATION DESIGN

The application is divided into three menu, which are material menu, guessing names menu, and guessing pictures menu. The material menu consists of three sub menus, namely chapters, videos, and practice questions. In the chapter menu, information is displayed divided into several slides where the user can press the previous and next buttons. In the question exercise menu, users can run multiple choice questions in accordance with the selected material. When it comes to the last question, the next button changes to finish which displays a review of the answers.

The guessing names menu is a multiple choice questions which has the same feature like the practice questions menu found in each chapter. In this menu, the questions cover all chapters. The process can be seen in Fig 1.

The guessing pictures is asking user draw hydrocarbon compounds in accordance with the questions given. Users draw on the box provided by dragging and dropping. When the user presses the answer button, the system checks the image, and displays the message in the form of an alert box. After arriving at the questions answered by drawing in the box provided. Checking answers is done by examining interconnected chains. Then an examination of the C atom is the most end and the

longest chain. Next, an examination of the child in the answer chain. The process can be seen in Fig 2 and Fig 3.
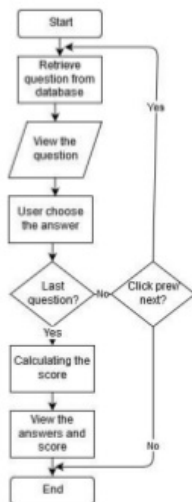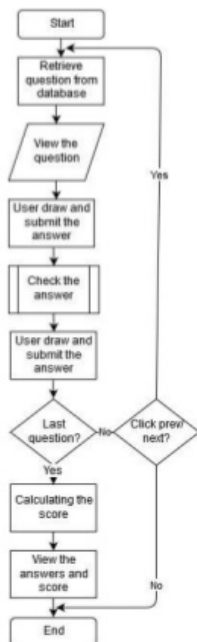

Fig. 1. Process of guessing names menu
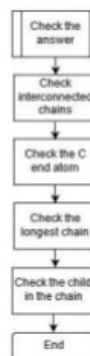

Fig. 2. Process of guessing pictures menu

Fig. 3. Check the guessing pictures answer

IV. IMPLEMENTATION

A. The material menu

The material menu page displays the material. The slide is divided into several pages where the user can press the previous and next buttons. The slide menu page can be seen in Fig 4.

Users can also tap on the image to see a list of image slides. The list of images is display in the form of thumbnails. Video's page can play mp4 video properly. Videos are downloaded and saved on internal memory of the smart phone. As a result, the internal memory in the application is greater because it is used to store videos from this learning application
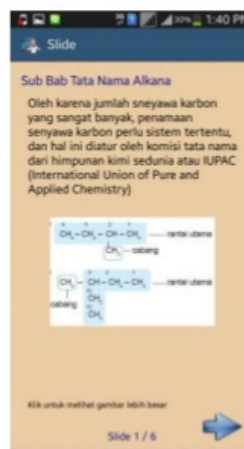

Fig. 4. The material menu

B. The guessing names menu

The guessing names menu is a page that displays the multiple choice questions. Questions can be selected from all the chapters. At the end of the questions, there is a review page

that display the selected answer, the correct answer, and the explanations. The guessing names menu can be seen in Fig 5.
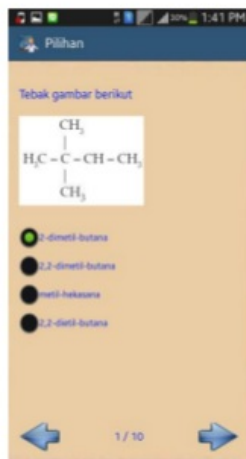

Fig. 5. The guessing names menu

C. The guessing pictures menu

The guessing pictures menu is a page that displays a compound name and user asked to draw the answer. On this page, the user can select and pair images according to the questions displayed. Users can press the answer button to find out the answer. When the user selects an image and places the image on the grid, there is an alert menu to move or rotate the image. Fig 6 shows that user must answer some question (for example 2-metil 1-butena) by drawing the compounds. If the user needs help, he can press the answer button.
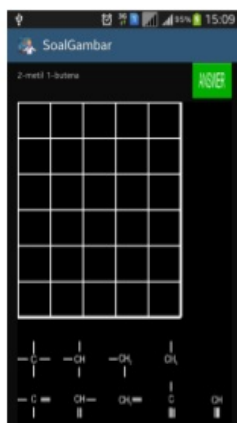

Fig. 6. The guessing pictures menu

When the user finishes drawing the answer, the user can press the answer button. The system will display the answer to the problem Fig 7).

Fig. 7. The review of guessing pictures

D. Versioning testing

The android application is tested on Lollipop (Android 5.1), Marshmallow (Android 6.0), Nougat (Android 7.0), Oreo (Android 8.1.0), and Pie (Android 9). The application run well on Nougat, Oreo, and Pie. On the contrary, some images cannot display perfectly on Lollipop.

Referring Fig 7, the Fig 8a display the page perfectly. However, the Fig 8b had some miss display, the width of the right answer area bigger than the original.
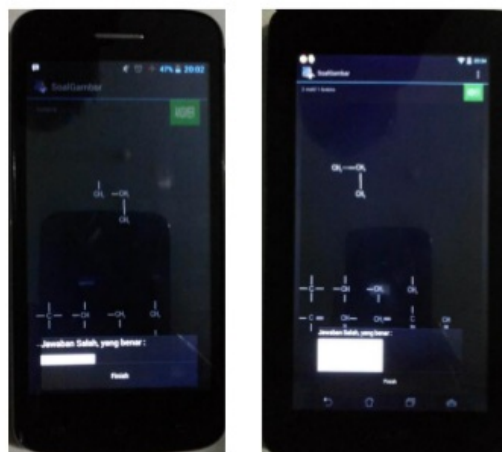

Fig. 8. (a) Marshmallow, (b) Lollipop

V. CONCLUSION

Applications can display chapters, multiple choice questions, and picture problems. The application can also display images and videos properly. The application can do the drag and drop feature well in the practice of drawing problems. The application can run well minimum on Marshmallow (Android version 6.0).

VI. ACKNOWLEDGMENT

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