Development of Augmented Reality (AR Ngeuna 4.0) for adolescents nutrition education medium based on Sundanese food

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Abstract. West Java with its diversity has variety of foods and snacks that are unique and rich in nutrition. The culinary growth in an area cannot be separated from its local wisdom and culture. In this era, the Sundanese food and some popular snacks are less known by public, especially teenagers. In daily consumption, the teenagers consume fast food more often than healthy food, which has become a trend among teenagers to know more about fast food and junk food. The solution to these problems is that researchers developed a media that can be used to introduce Sundanese food and popular snacks, with a touch of technology that makes it easy to learn. The purpose of this research is to develop a popular Sundanese food and drink database based on Augmented Reality, which can be easily accessed by teenagers as one of the health and nutrition learning media. This application is called Augmented Reality Tuangeun Sunda Era 4.0 (AR-Ngeuna 4.0). Making this augmented reality using the Unity 3D Vuforia SDK software. The making of an application begins with storyboard design, 3D objects from food design and Sundanese popular snacks using blender software that explains the description of the product, the ingredients used, and the nutritional content. To make the video, this paper used Wondershare Filmora software. It is used 3D as an effort to make AR-Ngeuna 4.0 compatible with many platforms. There have been trials using several devices such as iPad, tabs and smartphones and the application runs well on all devices used. It is expected that Augmented Reality Sundanese Tuangeun Era 4.0 (AR-Ngeuna 4.0) with AR-books is able to contribute to the media development and performance of online-based of nutrition education as a learning media that preserves Indonesian and Sundanese culture.

1. Introduction
The image of Indonesian food is known have typical variety of taste [1]. The progress of Indonesian food itself is growing rapidly due to creative and innovative ideas that are always created by various groups [2]. The progress is not only from the food trend, but a portrait of the popular snack in a certain area, which is always maintained and used as a culinary characteristic that can be found in every region [3,4]. Each region has its own culinary characteristics that cannot be separated from local wisdom and culture in the region itself [5].
Snack has a variety taste and dish made them as an icon of culinary in certain area [6], one of them is West Java which has various of culinary, both main course and also snack which has high nutrition. The various ingredients that used and the processing techniques make these snacks have high nutritional value [7]. Study shows food and snack that are popular in every region in Indonesia have high nutritional content which is good for health [8,9]. Snack seems to be the right food as variation [10]. Teenagers have a higher level consuming snack than main course [11]. But in fact, the teenagers did not know much about food and snacks that are popular in each region, they prefer to consume fast food [12]. Eating trends changed not only being full or healthy, but it also it changed in lifestyle [13]. The teenagers prefer to consume fast food, because it is more practical, fast in serving and has prestige for them [14-16]. But on the other hand, fast food contains relatively high levels of fat, protein, carbohydrate and salt, if they are consumed frequently and excessively, they can cause serious nutritional problems, one of which is obesity that often occurs to teenagers [17,18].

The solution to these problem is researcher developed a media that can be used to introduce traditional food and popular snacks, with a touch of technology that makes it easy to learn. Young people are more interested in dealing with technology than reading books manually [19], so the researcher are developing media that can be used by teenagers to get to know traditional popular foods and snacks from the region. The choice of media used for nutrition education is very important as well to influence the interest of the teenagers to learn it [20]. A lot of media can be used for nutrition education in teenagers, especially educational media that can convey about typical food and popular snacks of the region, such as books that contain text and images, multimedia (text, images, and animation) [21]. In this study, the researcher developed one of the media, namely Augmented Reality, this media has its own advantages, this media was designed by developing a popular Sundanese food and beverage database based on Augmented Reality, which can be easily accessed by teenagers as one of the health and nutrition learning media. The use of Augmented Reality (AR) media in the introduction of nutrition to adolescents has proven to be more interesting compared to other media, adolescents can better understand the nutritional content of food directly when using AR media [22].

The purpose of this research is to design and develop educational media for nutrition education based on local wisdom of Sundanese popular foods and drinks for teenagers who utilize technology, namely Augmented Reality (AR). In this study, the contents of educative media are for nutrition education especially in making popular Sundanese food and drinks as an alternative for fast food. The Augmented Reality (AR) media that was developed also contain information about the nutrition of several popular Sundanese foods and drinks so that the teenagers could have adequate knowledge and understanding in choosing appropriate and healthy food and snacks for consumption. The development of Augmented Reality (AR) media is used as a growth on online based nutrition education performance as a learning media [23] that preserves Indonesian culture, especially the popular Sundanese food and beverage.

2. Methods
The educative media which developed to take advantage of AR to introduce culture and local wisdom to the teenagers in this study is "Augmented Reality Sundanese Era 4.0 (AR-Ngeuna 4.0)". The creation of Augmented Reality Tuangeun Sunda Era 4.0 (AR-Minimal 4.0) was developed with the help of Unity 3D software and vuforia SDK. Visual Studio 2012 is used in the Augmented Reality Code Ebook 4.0 (AR-Less 4.0). While creating resource objects and markers using Corel Draw X7 and blender. The application development consists of several steps, namely creating 3D objects using blender software and making videos through storyboards.

3D from the design of popular Sundanese food and beverage use a blender software that explains the description of the product, the ingredients used, and food nutritional contained. The types of food described in this application are "Asinan Bogor" (Sundanese fruit salad preserved with vinegar), "Cincau" (Sundanese popular drink in the form of jelly), "Jalabiya" (popular Sundanese snack shaped in a ring), "Mie Kocok Bandung" (Sundanese popular snacks with typical gravel), "Nasi Liwet" (complete Sundanese rice dish) and "Seblak" (Sundanese snack, crackers plus spices).
The videos are created and rendered using Wondershare Filmora software. The video is about materials and the process of making Asinan Bogor, Cincau, Jabaliya, Mie Kocok Bandung, Nasi Liwet and Seblak. The next step is to make AR-Ngeuna 4.0 using Unity3D software. This software has chosen because of its compatibility and accessibility on many platforms [24]. Before using Unity3D, the SDK extension for Vuforia should have been installed to be able to use the Augmented Reality feature. The Extension SDK itself can be downloaded via the Vuforia website (https://developer.vuforia.com/resources/sdk/unity).

Figure 1. AR-Ngeuna 4.0 flowchart.

Application user will be asked to fill in their user names and passwords on the LOGIN form (see Figure 2). If the username or password is incorrect (not in the database), there will be a warning that takes the user back to the LOGIN form. When logging in successfully, the camera will be active and can detect markers in AR-Ngeuna 4.0 books. The camera will always be active until it actively detects marker. After the marker is detected, the application will determine whether it is 3D or video. 3D marker will detect and display 3D objects. Meanwhile, when the marker is in the video, there will be a video player equipped with play, pause, stop and exit the button. The camera will be automatically turn off when the video player is running.
3. Results and discussion

The development of educational media for nutrition education for adolescents is designed in the form of a book. The book, namely AR-Ngeuna 4.0, helps its users to learn about Sundanese popular food and beverage along with the AR-Ngeuna 4.0 application. This marker helps users to learn about Sundanese popular food and beverage by scanning food through AR-Ngeuna 4.0. The AR-Ngeuna 4.0 book itself uses the Adobe Illustrator application. This book consists of covers and topics such as popular Sundanese food and beverages, Asinan Bogor, Cincau, Jabaliya, Mie Kocok Bandung, Nasi Liwet and Seblak. On the page the food is measured, there are some pictures of popular Sundanese food and beverage, functioning as a marker for the application. Those markers are drawings made by the Vuforia SKD application so they can be detected by AR-Ngeuna 4.0. One of the strengths of the markers made by Vuforia SKD is that they are not monochrome so that the AR-Ngeuna 4.0 can easily recognize them. For images to be used as markers, images must be uploaded as target managers for the database provided by Vuforia. The target manager can be accessed at https://developer.vuforia.com/target-manager and download using "*. Community package" format. The AR-Ngeuna 4.0 application and its book have been designed. Figure 3 shows the trial results of the application on the measured food page. Meanwhile, popular Sundanese food and beverage names will be displayed on the application.

Figure 3. The use of AR-Ngeuna 4.0 in food page, size on book.

Figure 4 illustrates an example of the scanning marker result for the product description. Bookmark is identified by the application as marker to reveal the description of Asinan Bogor.
The 5th Annual Applied Science and Engineering Conference (AASEC 2020)  IOP Publishing
IOP Conf. Series: Materials Science and Engineering  1098  (2021) 022094  doi:10.1088/1757-899X/1098/2/022094

Figure 4. Scanning the result by the AR-Ngeuna 4.0 application for product description marker.

Figure 5 shows the marker of scanning result for 3D object. The book marker is recognized by the application as a marker that shows the video player running about the making of Asinan Bogor and explaining nutritional information for audience.

Figure 5. Scanning Results by AR-Ngeuna 4.0 application for 3D objects markers.

The function of AR-Ngeuna 4.0 application using the black box technique is to test the function features of the application. The test has been completed through five steps / aspects. Based on the test results, it can be concluded that every feature in the application runs well. The first aspect relates to the installation of an APK file in the sense of whether there is a proper installation on an Android-based smartphone. The second aspect of the test is whether the application is opened properly. The third aspect is related to the login form. To check whether it is going well or not, one way is that unregistered accounts will be brought back to the login form when they try to log in, while registered can directly access the camera to detect marker. The fourth aspect related to marker detection; the test result shows 3D object or video player when properly installed. The last aspect is related to the buttons on the video player (exit, play, pause, and stop). Good result from the test must do every button as designed. After these five aspects of the test, there need a further test related to the response when the application is run. This is necessary because the number of 3D object to show is relatively high. This test is carried out to find out the specification of the minimum device that able to run AR-Ngeuna 4.0. Thus, this test was carried out on three devices with different specifications. All three devices use at least Android v4.2, because AR-Ngeuna 4.0 uses a minimum API level of Android 4.2. (Jelly Bean). The result shows that the device must have at least 2GB RAM and a quad-core 1.2 GHz to be able to run application. In other words, a device with that specification or above can run it well.

4. Conclusion
The result shows that AR-Ngeuna 4.0 has a high appeal among teenagers in introducing nutrition education based on local wisdom to the popular Sundanese food and beverage. This application can be used in various platforms, one of which is Android, the teenagers mostly use Android for their
smartphones. This application is very compatible with android, besides, this application presents not only text but also videos that can enhance teenagers' knowledge and understanding of Sundanese popular foods and beverages. The video is presented about the process of making the product itself, starting from the material used, the equipment to the stages in making the product. Moreover, in this media the nutrition and nutritional content in these foods are described, it is a superior feature of this application. The fact mention that teenagers are more interested in learning popular food and beverage in other region by using media which is equipped with technology, it is like a special attraction among teenagers. Researcher hopes that the development of media based on Augmented Reality can be developed in the discussion or topic in other lessons because this media is quite easy to design and easy to apply.

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