

## **Fruit Audio Aroma: Innovative Learning Media For Optimizing The Sense Of Touch, Listening, And Smell In Blind Children**

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**Abstract:** Education for blind children begins at the age of childhood and elementary school. At that age, blind children will begin to be introduced to fruits. However, in general, teachers in special schools will introduce fruits to blind children using only real fruit. This is considered ineffective, because the fruit recognition learning process only relied on the ability of the teacher that causes blind students to get bored quickly and the material presented by the teachers is not well received. Therefore we need a 3D fruit learning media designed according to the characteristics of blind children. The purpose of making Fruit Audio Aroma media is as a solution to overcome problems in the learning process of the blind children with disabilities related to fruit material. The method used is the observation method. The result of this study indicated that the Fruit Audio Aroma media provides maximum usability with easy and practical use, according to the needs of the blind through aroma, braille, texture, QR code and audio features that can be operated smoothly. Thus, this media is effective for increasing the sensitivity of the sense of touch, hearing and smell in blind children.

**Keywords:** blind children, 3D fruit learning media, braille, audio, aroma

### **INTRODUCTION**

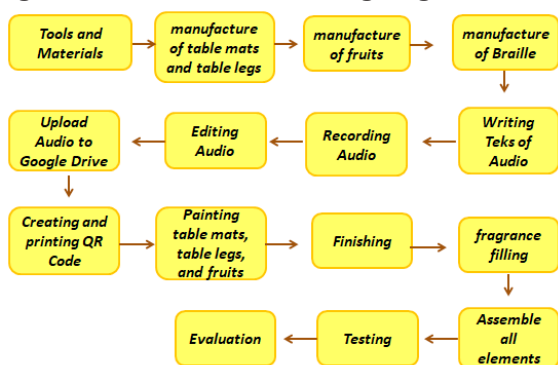
Children with special needs are children who have special characteristics and certain barriers that are different from other children of their age, the process of growth and development in children with special needs can also be affected by this situation, so special treatment is also needed for children with special needs so that they can grow and develop optimally. According to Rafikayati, Badiah, & Soedarmadji (2018), children with special needs are individuals who have special characteristics, where these characters are different from children in general, especially in terms of cognitive, emotional, and physical aspects. Children with special needs are grouped into several types. One type of child with special needs is visually impaired.

Blind children are children who have obstacles or disturbances in terms of their vision. Therefore, blind children use their other senses to communicate with the outside world. Kurniawan (2015) explains that children with visual impairments or visual impairments will rely more on the sense of touch and sense of hearing to interact or get acquainted with the outside environment. In line with the previous explanation, Baktara & Setyawan (2020) stated that blind children must be able to maximize their other senses, because by maximizing the senses that are still functioning, blind children can move and can become independent children like normal children with a vigilant view. Although blind children have visual impairments, blind children have

the same opportunities as normal children in the field of education. Education for blind children themselves must also be adjusted to their needs.

Just like normal children, education for blind children begins at the age of childhood and elementary school. At that age, blind children will be introduced to fruit material. In general, teachers in special schools (SLB) will introduce fruits to blind children using real fruit. But it is considered ineffective. Because the fruit recognition learning process only relies on the ability of the teacher, which causes blind students to get bored quickly and the material presented by the teacher cannot be received well. In addition, according to Febriana (2013), children who are hampered in terms of vision will usually have a deficiency in basic concepts and find it difficult to integrate important pieces of information from the environment that are useful for forming some of these concepts. The information conveyed by the teacher in the abstract coupled with the obstacles possessed by blind students is the cause of the need for presenting information in a concrete/clear form (Srirahajeng & Kustiawan, 2014). Therefore we need a fruit learning media that is designed according to the characteristics of blind children.

Alwi (2017) wrote that the use and provision of learning media during the learning process is absolute, so that learning media cannot be ignored. Learning media itself can be interpreted as an object or tool that can be used by teachers to facilitate the delivery of material to students.

**Figure 1. Product Manufacturing Stages**

Nurrita (2018) suggests that learning media is a learning resource that is used to assist teachers in the process of enriching students' insight, so that it will provide useful knowledge for students. Meanwhile, according to Yanto (2019), the use of learning media is useful for streamlining the teaching and learning process and the process of delivering material, besides that the presence of media in a lesson will also help increase students' understanding of the subject matter. For blind children, the use of learning media must be designed according to the characteristics that exist in them. This is in accordance with Wahyuni's opinion (2017) which states that learning media for children with special needs must also have specificities that are in accordance with the characteristics of the students with special needs.

The first characteristic of learning media for blind children is media in the form of 3D (three dimensions). The next character is media that has audio, the use of audio-based media as learning media for blind children will make blind children learn by listening, so that the motor skills of blind children can be trained and they can imagine an object in detail according to the audio that has been heard (Praptaningrum, 2020). Another character is media that has braille in it, because reading and writing braille is one of the means for blind children in terms of obtaining information and communicating with other people using the tactile or tactile senses (Rudiyati, 2010). The last characteristic is media that has an aroma, because aroma can be used to increase the sensitivity of the sense of smell in blind people (Wulandari, 2018).

Learning media for fruits that match the characteristics described above is Fruit Audio Aroma. Media Fruit Audio Aroma is an innovative learning media in the form of 3D fruits in which there are audio in three languages, namely Indonesian, English, and Javanese. Where the audios are stored on Google Drive and will be presented in the form of a QR Code that can be scanned with a scanner application that can be downloaded on the Play Store. There is also a scent that comes from fruity perfume and there are braille

letters engraved on the base of the media.

Media Fruit Audio Aroma was created with the aim of being a solution to overcome problems in the learning process for blind children with disabilities related to fruit material. So that the benefits are obtained, namely to increase and optimize the sensitivity of the senses of touch, hearing, and smell in blind children. In addition, it can be used to teach language diversity to blind children. Finally, it can be a solution in saving school funds, because schools only need to buy this media once and after that can use it repeatedly.

## METHOD

The method of this study was the observation method. This observation method was carried out to observe the main material needed in the manufacture of products, that was wood. Furthermore, it was teak wood that was chosen to make this Fruit Audio Aroma product. Other tools and materials needed in the manufacture of Fruit Audio Aroma products were in the form of wood glue, nails, sandpapers, various colored paints, thinner and brushes. The tools and materials would be prepared, after which the product manufacturing process could be carried out. The manufacture of this Fruit Audio Aroma product was located in Blera City.

The manufacturing process would be carried out in several stages. Briefly the stages of the manufacturing process could be seen from the Figure 1.

From the figure 1, it could be seen that the stage of made a product after collectinng tools and materials was made media mats and media feet. The media base and foot were made by cutting and connecting technique. The cutting technique was mainly used when made the media base and legs, while the joining technique was to created a table shape through connecting the media base and legs. The media base was made with a size of 40 x 30 x 2 cm. On the base, a QR Code sticker would be affixed with a braille engraving with the fruit's name on it. As for the media legs, there would be four pieces with a size of 6 x 4 x 30 cm. The legs were made with the aim that this learning media was easy to moved and easy to carried everywhere.

The next stage was the manufacture of fruit variants, which amount to 15 types of fruits. This section was the main part of the Fruit Audio Aroma. The process of made fruit used carving and cutting techniques. According to Mardiani, Nugroho & Riskyanto (2018), carving techniques are sculptures that come from wood. Meanwhile, according to Afif, Efrizal, & Irwan (2018), carving techniques are techniques to remove wood parts that are not needed and are not used by carving. In this part of the fruit there would be a part of the fruit itself, the lid, and the small holes. The fruit section was in 3D shape with a

texture that was adapted to the real fruit depicted. The lid was designed with an open and closed model with a holes design in the media cover. A holes in the lid aims so that blind children could immediately smelled the aroma on the media without had to removed the lid. The aroma obtained from perfume seeds was stronger and longer lasting.

The next stage was made braille, the purpose of made this braille was to optimized the sense of touch in blind children. Braille letters were made in the form of carvings, located on the media pedestal table. The engraving had six dots with the provision that the dots read were the ones with the larger diameter (the diameter was twice as large as the smaller dot), while the smaller-diameter dots were used as an aid in reading braille. This braille letter describes the name of the fruit.

Then, the text was written in three languages. The three languages were Indonesian, English, and Javanese. The audio text contains the characteristics of each type of fruit. After the text had been compiled, it would proceed to the stage of audio recording and audio editing. Audio was made with the aim of optimizing the sensitivity of the listener's senses in blind children. The edited audio was uploaded to Google Drive. After that, a QR Code was created that contains the audio link that was uploaded on Google Drive earlier. The QR Code that had been completed would be printed in the form of a sticker. QR Code measuring 5 x 7 cm and affixed to the base of Fruit Audio Aroma.

Next, the painted process would be carried out on the table base, legs, and fruit parts. Parts of the fruit would be painted as closely as possible to the real fruit. After the painted process was completed, the finished process was carried out so that the Fruit Audio Aroma product became more beautiful. After the finished process was completed, then fill the fruit aroma on the inside of the fruit media. Fruit Audio Aroma products were ready to be tested.

The tested process was carried out by direct testing techniques on blind students. In the test, blind students were directed to used Fruit Audio Aroma by touching the texture and smelling the fruit elements, then reading braille and listening audio in Indonesian, English, and Javanese related to fruit descriptions. To determine the effectiveness of Fruit Audio Aroma, a comparison was made with testing using real fruit. The test results show that the Fruit Audio Aroma media was more effected in provided understanding of fruit for the visually impaired with the advantage of the braille feature, the audio contains fruit descriptions that were not available on real fruit. If in the tested process there was a problem, an evaluation stage would be carried out.

## RESULT AND DISCUSSION

### *Media Characteristics*

The Fruit Audio Aroma product was an innovative learning media product in the form of 3D fruits equipped with audio in three languages (Indonesian, English, and Javanese), aroma, and braille (Figure 2).

The media was made in 3D form because 3D media was a medium with length, width, and volume, which means that the media involves the sense of touch which was in accordance with the characteristics of the blind children. Agustina & Farida (2019) stated that teachers need 3D learning media that can be touched by students with visual impairments, so that students are able to gain direct experience and can construct their own knowledge. Meanwhile, according to research from Wibawa (2018), it was found that student scores increased due to the impact of the application of 3D learning media in improving the ability to recognize objects in blind students in special school.

The media was made with aroma features, the aim was to optimized the sense of smell in blind children. Aroma-based learning media for blind children was not yet available. In fact, blind students also had to hone their sense of smell to recognized something around them (Figure 4, Figure 5, and Figur 6). Because by smelling someone's perfume or scent, blind students can recognize the school environment or the environment outside of school (Fawwaz & Ramadhana, 2020). The aroma feature was contained in the Fruit Audio Aroma media which was designed with an open and close model with a hole design in the media lid. Making a hole in the lid aims so that blind children could immediately smell the aroma on the Fruit Audio Aroma media without removed the lid. Aroma was obtained from perfume seeds which had a stronger and longer lasting aroma.

The media was made with audio features with the aim of optimizing the senses of listeners in blind children. Because in blind students, the sense of hearing would be one of the important sources used to obtain sources of information. Praptaningrum (2020) writes that by using audio-based learning media, blind students will be more motivated and can more easily understand learning, can learn by imagining the sound heard from the audio being played, so that blind students will better understand the material being presented. In line with this, according to research conducted by Mardiaty, Salikun, & Aprianti (2018), it was found that the process of material exposure using audio-based media in blind children experienced an increase in results, this was because when researchers explained the material there were many blind students who listened carefully. good and thorough.



Figure 2. Product Variants of Fruit Aroma Audio

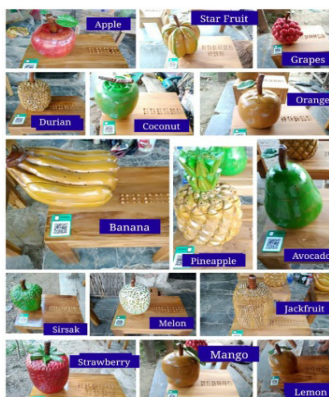


Figure 3. Small Holes in Tthe Lib



Figure 4. The Lid of Media

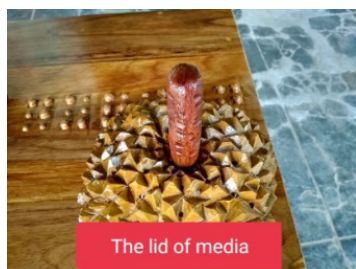


Figure 5. Fruit Scent Place

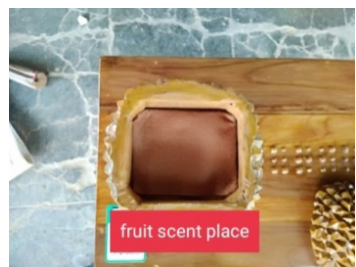


Figure 6. QR Code and braille

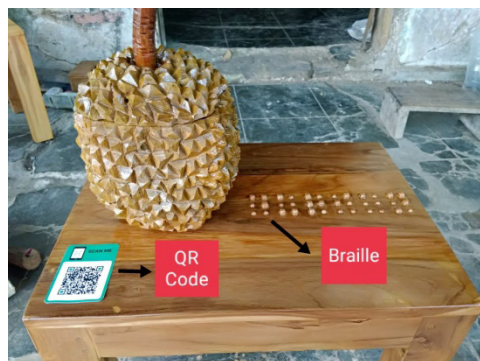
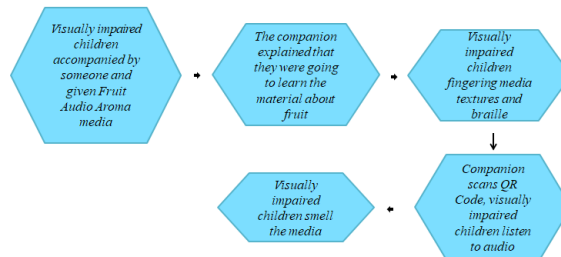


Figure 7. Ways of Working



Audio on the Fruit Audio Aroma product would be made in three languages, that was Indonesian, English, and Javanese. So in addition to optimizing the sense of hearing, audio could also be used to teach language diversity to blind children. This audio would be stored in Google Drive and was available in the form of a QR Code affixed to the bottom of the media. Audio could be heard by scanning the QR Code that was already available with the help of the QR Code Reader application (or similar applications) which could be downloaded on the Play Store and App Store.

Lastly, the Fruit Audio Aroma media was equipped with a braille feature with the name of the fruit on it. The braille feature was created with the aim of optimizing the sense of touch in blind children. According to Rudiwati (2010), reading and writing Braille is one of the means for blind children in terms of obtaining information and communicating with other people using the tactile or tactile senses. Braille letters was made in the form of engraving, located on the base of the media. The engraving had six dots with the provision that the dots read was the ones with the larger diameter (the diameter is twice as large as the smaller dot), while the smaller-diameter dots was used as an aid in reading braille. This was in accordance with the opinion of Pujiputra (2016), that is the preparation of braille letters is based on a pattern with 6 raised points consisting of a vertical point and a horizontal point. Each dot is numbered 1, 2, 3, 4, 5, and 6. The way to read the braille letters engraved on the base of this media is to read from left to right.

### Ways of Working

How the Fruit Audio Aroma learning media product works could be seen in the Figure 7.

### Feasibility

The feasibility of the Fruit Audio Aroma media was measured using a testing process. This test was carried out on all parts (features) of the Fruit Audio Aroma media. Tests on audio player and aroma were carried out to check the safety of the replica form for children and to made sure the system was working as expected. If in this stage errors or discrepancies were found, an evaluation stage would be carried out. In the Fruit Audio Aroma test, comparisons were made on the real fruit with the comparison results in Table 1.

**Table 1. Comparison of Real Fruit with Fruit Audio Aroma**

Real Fruits	Yes	No	Score	Description
Sense optimi- zation	Touch	-	3	The sense of touch was optimized for touching fruit.
	Listener		0	Unable to optimized hearing.
	Smell	-	2	The sense of smell could be optimized in some fruits, but some are not smelly.
	Taste		3	Could be used to optimized the sense of taste.
Complete fea- tures	Fruit tex- ture	-	2	There were only textural features in the fruit, no other texture features such as braille.
	Braille	-	0	No braille feature
	Audio	-	0	No audio feature available
	Smell	-	3	There was an odor in the fruit
	Flavor	-	3	There was a taste feature
Total			16	
Fruit Audio Aroma	Yes	No	Score	Description
Sense optimi- zation	Touch	-	3	Optimized sense of touch through fruity & braille textures
	Listener	-	3	Optimized the listener's senses through audio
	Smell	-	3	Optimized the sense of smell from fruity aromas.
	Taste		0	No flavor feature
Complete fea- tures	Fruit tex- ture	-	3	There were features of fruit textures and also features of braille.
	Braille	-	3	There was an audio in Javanese, Indonesian and English that explains the fruit description.
	Audio	-	3	It had a fruity scent.
	Smell	-	2	There was no taste feature, but students could found out the taste through the explanation on the audio.
Total			20	

**Table 2. Test Result**

Rated aspect	Criteria	Test Success		Description
		Yes	No	
Use of Media	Improve student understanding	-		Blind students were able to answered questions quickly and accurately
	Media increase the sense of smell, touch and hearing	-		Blind students were able to distinguished many fruit scents. Blind students were sensitive to Indonesian, Javanese, and English. Blind students were able to distinguished the textures of some fruits
<b>Ease of Use</b> [easy to use, easy to learn, practical, easy to operate, easy to understand, as needed, not to cause trouble]	The media is easy to use	-		The media was accompanied by instructions which easy to understand
	The scent smell good	-		The scent of fruit perfume smells strongly, the aroma was similar to real fruit
	The braille is well	-		Braille could be felt and read quickly
	The texture of fruits are well	-		The texture was the same as real fruit, so students were able to felt the texture and be able to determined the type of fruit
	The QR Code is well	-		QR Code could be scanned quickly
	The audio is fluent	-		Audio could be played and heard well

**Description:**

0 = Does not optimize the senses of the visually impaired/incomplete features

1 = Lack of optimizing the senses of the blind/incomplete features

2 = Enough to optimize the senses of the blind/quite complete features

3 = Highly optimized for the visually impaired/quite complete features

From the score obtained, Fruit Audio Aroma was more able to optimized the senses of touch, hearing, and smell for the blind, with a more completed feature set than real fruit. Therefore, further testing of Fruit Audio Aroma on the effectiveness of learning for the visually impaired was carried out. From the implementation of this test, useful results would be obtained for evaluation. The results of the Fruit Audio Aroma test could be seen in Table 2.

The advantage of the Fruit Audio Aroma media was designed in 3D from teak wood. Then, the Fruit Audio Aroma media was equipped with various features adapted to the characteristics of the visually impaired, including braille fitur, an aroma that resembles real fruit, and Indonesian, English, and Javanese audio presented in the QR Code. This media could also be available at any time. In contrast to the use of real fruit, sometimes there were some fruits that were only available in certain seasons, for example durian. With Fruit Audio Aroma, blind students not only learn about fruits, but also learn about the diversity of languages at the same time.

The disadvantage of this Fruit Audio Aroma media was not equipped with fruit flavoring features. Fruit Audio Aroma media was useful for overcome existing problems regarding the limitations of learning media for visually impaired children with special needs. This media plays an important role in the delivery of learning materials related to the introduction of fruits, plays a role in optimizing the senses of touch, hearing, and smell for the visually impaired so that they could recognized objects around them, and could also play a role in teaching language diversity to the visually impaired, especially Indonesian, Javanese, and English.

Specifically, Fruit Audio Aroma was beneficial for several parties, that was the school, the teacher, as well as the students. The benefits for the school were: it could save funds used to buy fruit for each lesson, Fruit Audio Aroma media could be used instead of real fruit because it was accompanied by various features including aroma, this media was durabled and long lasted so it could be used many times. The benefits of Fruit Audio Aroma for teachers were to: made it easier for teachers in the learning process of fruits for the visually impaired with various features (audio, aroma, and braille features) and to made it

easier for teachers to created student-centered learning because students wold be more actived in learning, while the teacher only provides a little explanation, direction and supervision. Lastly, the benefits of Fruit Audio Aroma for students were to: made it easier for them to understood learning about fruits. This was because the Fruit Audio Aroma media would improved the imagination power of blind students. In addition, it could improved the senses of listeners by listening to audio, improved the sense of smell by inhaling fruity aromas on the media, and improved the sense of touch through three-dimensional features and palpable braille. Then, it could made it easier for students to learn three languages, that was Indonesian, Javanese, and English.

**CONCLUSIONS**

The Fruit Audio Aroma product is an innovative learning media product in the form of 3D fruits equipped with audio in three languages (Indonesian, English, and Javanese), aroma, and braille. This media was created with the aim of being a solution to overcome problems in the learning process for blind children with disabilities related to fruit material. Thus, providing benefits in delivering learning materials related to the introduction of fruits; optimizing the sense of touch, hearing, and smell in the visually impaired crew members, which allows the blind crew members to recognize objects around them; and could be useful for teaching language diversity to blind crew members, especially Indonesian, Javanese, and English. In other words, specifically Fruit Audio Aroma is beneficial for several parties, namely the school, the teacher or the teacher, as well as the students.

To increase the effectiveness of using Fruit Audio Aroma media, it is recommended that schools or other parties develop features that are not yet contained in Fruit Audio Aroma media in the form of fruit flavoring features.

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