

Development application smartness help for the disabled blind with text and image

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Abstract: Blindness is a condition in which a person's sense of sight does not function either partially (low vision) or as a whole (total blindness). Physical limitations make it difficult for them to access information and knowledge in the form of books or other printed media. This study was aimed at developing application smartness help for the disabled blind with text and image. The research method (R&D) uses the waterfall model. The study was conducted at SLB-A YPPLB Payakumbuh with the results of the assessment of material experts 93.3%, and media experts 86.7% who stated that the Smartness Help application was "very feasible" to use and be tested on blind people. The results of trials on blind people using the Smartness Help application yielded 87% results, all of which were categorized as very feasible.

Keywords: *application smartness help, text and image, person with blind*

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INTRODUCTION

Education is an important requirement for all human life to support the existence of quality human resources (Maher, Fitzgerald, & McVeigh, 2020; Pristiwanti, Badariah, Hidayat, & Dewi, 2022). Through the educational process, it is hoped that everyone will be able to provide benefits, both in the life of the individual himself or in the life of the nation and state (Mustaghfiroh, 2020). In general, throughout the world, children with disabilities experience many difficulties in learning and are often ostracized and even expelled from school (Kristiana & Widayanti, 2021; Nunung, 2022). School is an important educational institution after the family, which functions to help families educate children who are handed over to teachers as professional educators to provide knowledge, skills, and religious spirit to children, and so on (Nugiansah, 2020). The implementation of inclusive education in schools helps children who have special needs to be able to study at the same school with other friends (Bahri, 2022; Khayati, Muna, Oktaviani, & Hidayatullah, 2020; Love & Horn, 2021).

The development of science and technology (IPTEK) provides challenges for education graduates to create learning media that can improve the quality of education. The development of science and technology encourages teachers to produce computer-based learning media (Madanipour & Cohrsen, 2020; Mulyani & Haliza, 2021). With advances in technology, it is easier for teachers to create learning media for subjects that require high costs (Lestari, 2018; Sari, 2019). Digital technology is the key to bridging the continuity of the implementation of education if it is within the scope of all levels of education (Maritsa et al., 2021; Septianasari, 2022).

Each child's learning ability is very different, usually, some children tend to quickly understand the teaching material provided and some are slow, and some children have difficulty processing the subject matter given to them (Murni, 2018; Putri, 2021). Children who experience deficiencies both from an academic and non-academic perspective are children with special needs (Shapiro & Weiland, 2019; Wicaksono, 2022). It is necessary to carry out prior identification by the relevant teacher to be able to maximize every talent and ability possessed by the child and to be able to support the achievement of better self-quality (Rapisa, Damastuti, & Putri, 2021). Knowledge acquired by children from school is the result of teacher explanations and ideal learning is meaningful learning for children (Novantri, Maison, Muslim, & Afriyati, 2020).

Children with special needs are the center of attention and discussion in society, many terms intersect with the term children with special needs, which is often misinterpreted by the public. Children with special needs are children with special characteristics that are different from children in general without always showing mental, emotional, or physical disabilities. Another term for children with special needs is extraordinary children and children with disabilities, one of which is a blind child or can be called a blind person (Muzakkir, Nurhasanah, Fajriani, & Nurbaity, 2020; Switri, 2020).

Blind children receive fewer positive responses to them in a social setting or attempt to engage in social interactions and show less interest in their peers, which makes them more vulnerable to social isolation (Ayoung, Baada, & Baayel, 2021). There is still a need to know more about how blind readers want to access reading materials (Calvert, Creaser, & Pigott, 2019). Adulthood is the initial period of the individual adjusting to new life patterns and new social expectations. Blindness is a condition in which a person's sense of sight does not function either partially (low vision) or (totally blind) (Isni, Nurrohman, & Umbela, 2019; Taneo, Tarigan, Ngana, & Louk, 2022). This condition is caused by damage to the eye, optic nerve, and/or part of the brain that processes visual stimuli. This can happen at birth, and after birth. Blind people are very vulnerable to stress and depression. Physical limitations make it difficult for them to access information, entertainment, and other things that normal people can get. Therefore, most blind people do not receive motivation, entertainment, and advice.

From these conditions, blind people experience obstacles or disturbances in the process of their vision, so they need compensation tools in the form of learning media and the application of various methods and teaching techniques that are more interesting and varied to facilitate their learning activities. The use of teaching methods and techniques using objects directly will increase the abstraction power of the blind, so that the abstraction power of the blind can develop, in the teaching and learning process should use learning methods that involve the active role of the blind in the learning process.

The fact is that many blind people have difficulty obtaining knowledge and information, both in the form of books and other printed media. The writer finds blind people with totally blind eyes. Meanwhile, at the educational level, blind people experience problems in obtaining knowledge or information in book form, this is due to the limited availability of books translated into Braille. In line with (Hermawanto, Sabiku, & Dai, 2019; Mambela, 2018) explained the opinion that in accessing information, blind people are different from individuals in general. Where normal individuals can see what they are around making it easy for them to get a lot of information, but the blind have to use their sense of touch and sense of hearing to be able to obtain information. To obtain visual information (text), blind people use Braille-printed reading materials. However, the availability of text information in Braille is very limited. So

that the limited information in the form of Braille becomes an obstacle for blind people when they want to know the information contained in newspapers, magazines, books, and so on. In addition, blind people need information through visual media. Especially for writing or text provided in Braille.

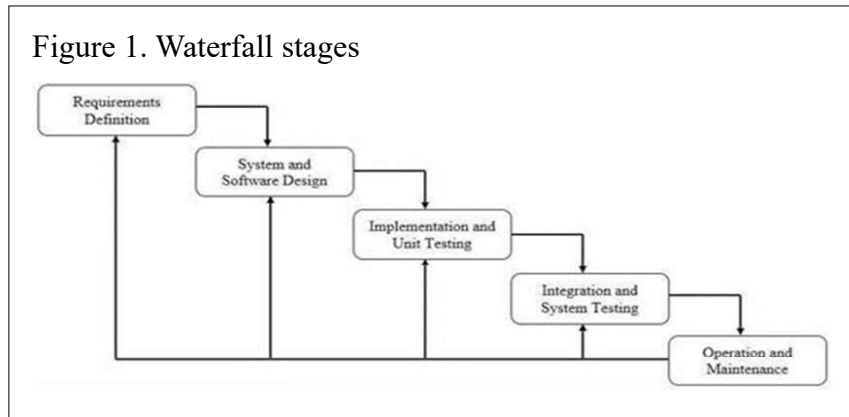
Based on the problems found in SLB A Payakumbuh, it is stated that many blind people have difficulty obtaining knowledge and information in the form of books and other printed media. The unmet need is due to the limited reading resources of translated books into Braille writing. From these problems, the researcher has an idea to help blind people in reducing the difficulties they experience in obtaining knowledge or information in book form by developing an application called smartness help (image detection and writing detection).

Applications are software used for specific purposes such as document processing, word processing, images, and so on (Chen, Sherren, Smit, & Lee, 2021; Tri, 2020). Application multimedia combines two or more media elements consisting of text, graphics, images, photos, audio, and animation in an integrated manner (Adnyani, Wisudariani, Pradnyana, Pradnyana, & Suwastini, 2021; Hai, Zhong, & Li, 2020). Meanwhile, the smartness help application aims to make it easy for blind people to obtain information on images that can be scanned via the QR code in the application and on the alert text. Teaching and learning activities are a condition that is deliberately created, creative educators will always create ideas in designing new learning systems that can enable students to achieve their learning goals with satisfaction (Putri, Wahyuni, & Suharso, 2018). Creative educators will always create ideas in designing new learning systems that can enable students to achieve their learning goals with satisfaction (Anugraheni, 2018; Handayani, 2021) is needed in schools, especially learning in the classroom. The presence of various kinds of applications will help facilitate educators in their learning needs (Amrulloh & Indrianto, 2022).

METHOD

Research and development of smartness help application use the (R&D) research methods used to produce certain products and test their effectiveness of this product (Fransisca & Putri, 2019; Sugiyono, 2019). The results of the application development in this study are that smartness help application media for blind people to detect writing and images. In research using the waterfall method, the waterfall approach is a method that is carried out in designing a system systematically and sequentially. The waterfall method is a classic method that is systematic, and sequential in building software (Herawati, Negara, Febriansyah, & Fatah 2021; Sadi, Lucitasari, & Khannan, 2019; Wahid, 2020). By analyzing the application in the form of smartness help with text and image detection that can be developed and is feasible to be applied to research subjects. The procedure for developing the smartness help application foris text and image detection is explained through the flowchart in Figure 1.

The waterfall method has several stages as a reference for the research to be carried out (Wahid, 2020). *First*, requirements analysis and definition. This stage in the development required communication that aims to be able to understand the software so that it can be used by users. The forms of information that can be obtained are through observation, interviews, and discussions so that the information obtained can be analyzed by users. *Second*, system and software design. At this stage, the development of a system design is to help determine the device and system requirements. Furthermore, at this stage it will then be implemented in the development design, the design is carried out to be able to help



and provide a complete picture of what will be carried out. *Third*, implementation and unit testing. At this stage, there is a process of writing code, where the creation of the software will be broken down into small modules which will later be combined in the next stage. At this stage, a deeper examination will also be carried out regarding the modules that are made so that they can fulfill the expected functions. *Fourth*, integration and system testing. At this stage, a merger of the modules that have been made is also carried out. Then testing will be carried out which aims to be able to find out whether the application made is by the desired design or whether there are still improvements. *Fifth*, operation and maintenance. In the final stage, of this development method is where the finished software will then be tested on users according to the uses and needs of the users.

Product eligibility. The feasibility test study of application products was made through the analysis of qualitative data from questionnaires in the form of suggestions as well as quantitative data from the results of the questionnaire from material experts and media experts to obtain an assessment of the feasibility and effectiveness of the application being developed. The eligibility criteria used in the study as seen in Table 1 (Sugiyono, 2019).

Table 1
Assessment criteria

Percentage (%)	Criteria	Category
81 – 100	Very worth it	Accepted
61 – 80	Worthy	Minor revision
41 – 60	Pretty decent	Minor revision
21 – 40	No worth it	Major revision
0 – 20	Not feasible	Total revision

Analysis of the feasibility of the application is obtained from the results of assessments by material experts, media experts, and teachers. Feasibility data can be analyzed with calculating the score obtained from each questionnaire. Calculating the average score with the formula (1).

$$P_s = \frac{n}{N} \times 100\% \quad (1)$$

Information:

Ps = Score Percentage

n = The total score obtained

N = Maximum total score

Conduct an analysis on the acquisition of scores from validation questionnaires to be converted into qualitative data on a scale of five with reference to guidelines (Kudsiah & Alwi, 2020; Widoyoko, 2017) that the feasibility of the Smartness Help application developed in this study is determined from the acquisition of assessment scores by material experts, media experts and teachers with a minimum score of “Good” category. If the minimum final result is in the “Good” category, it can be stated that the Smartness Help application product is feasible and can be used as an application to meet the needs of the blind.

FINDINGS AND DISCUSSION

Findings. The result of the development of the smartness help application for text and image detection that can be installed via a smartphone. The approach used in this study, namely the waterfall approach, consists of five stages, namely: requirements analysis and definition, system and software design, implementation and unit testing, integration and system testing, operation, and maintenance. In the requirements analysis and definition stage, observations and interviews are carried out at this stage regarding the needs of blind people in obtaining knowledge or information in book form, this is due to the limited availability of translation books into braille writing.

The requirements analysis and definition are carried out to collect information in the field so that the development carried out can be right on target and achieve learning objectives. *First*, needs analysis is carried out through observation during the learning process and teacher interviews to find out the learning needs of blind people and component requirements in developing appropriate learning media including views, topics, and supports. *Second*, curriculum analysis was carried out by looking at the competency mapping in the 2013 curriculum as the basis for determining the material and topics used as content in development media. *Third*, analysis of the characteristics of the blind is carried out through activities observation during the learning process to determine the needs of blind people including the interests and motivations of blind people.

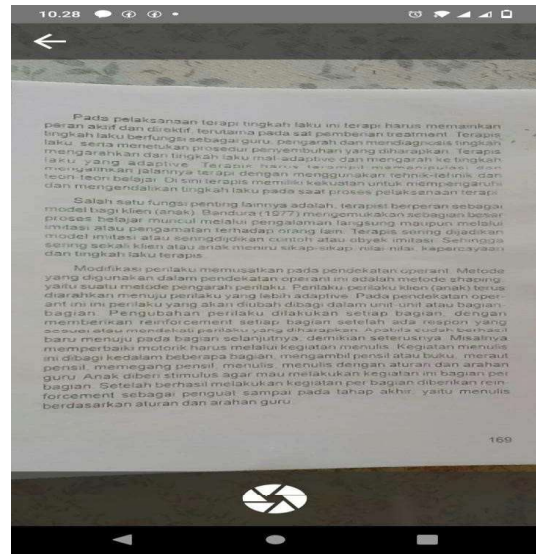
The implementation and unit testing of the smartness help application (image and text detection) starts from the initial appearance of the menu in the application which consists of the text detection menu and QR code, camera, and sound. The camera menu can zoom in and zoom out which works as zoom in and zoom out catch screen on the text you want to take. The camera menu can zoom in and zoom out which functions to enlarge and reduce screenshots of the text you want to take. In the application there is a volume that will emit a sound to be able to say what was captured by the camera and the scanned image will make a sound according to the text or image captured by the camera.

As for how to use the smartness help application for the blind to be able to obtain information and knowledge by using the smartness help application (Figure 2), there are several steps. This application because it consists of two functions, one for image detection and one for writing detection.

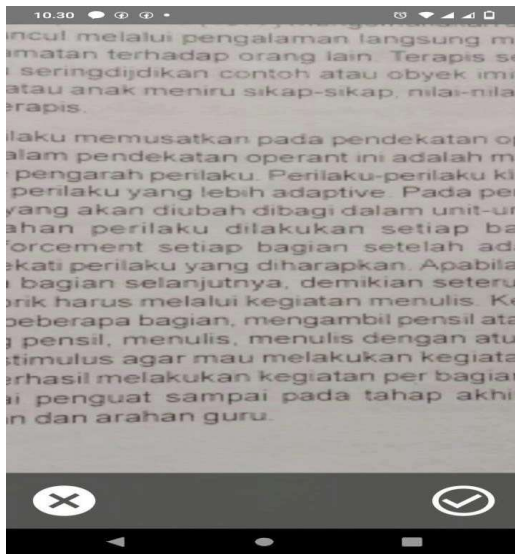
Figure 2. The use of write detection



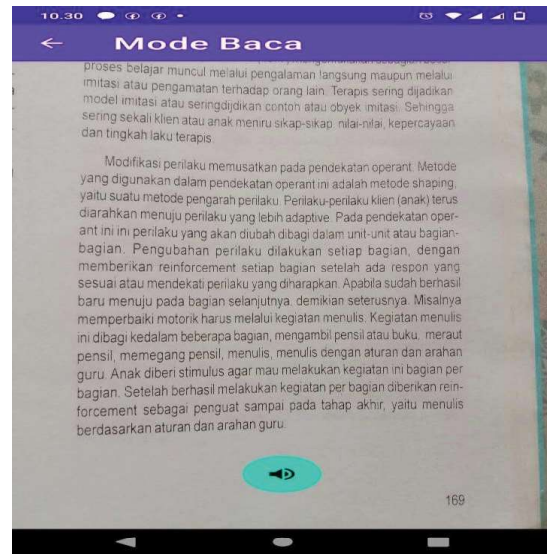
a. Initial look



b. Second look



c. Third look

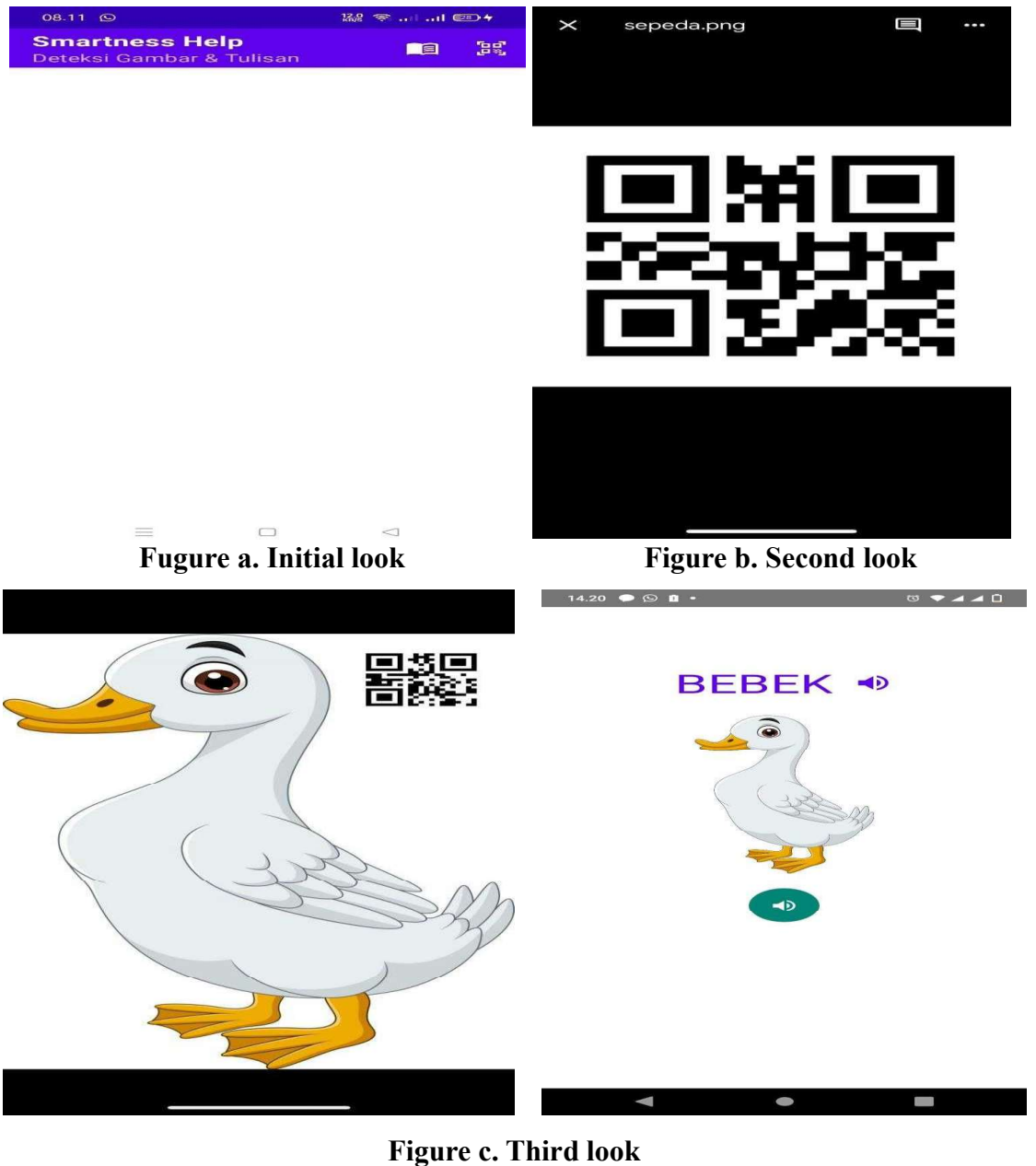


d. Fourth look

Notes:

- a. In this menu there are two main menus, namely to scan text and images. Select the text scan menu in the upper right corner, which has an icon that looks like a book.
- b. In this step, select the text you want to scan. Either from a book, newspaper, or other, then click the camera button below to take a photo of the text.
- c. Then after being scanned by the camera a display like this will appear. So, if the writing is correct then select the checkmark.
- d. Next, a reading mode display will appear, then click the volume icon to listen to the text that has been scanned and the application will automatically read the text that has been scanned.

Figure 2. The use of detection picture



Notes:

- Enter the application than in the initial view select the scan icon in the upper right corner next to the book icon then click the scan icon.
- Then both select the image that already has a QR code and then scan the QR code
- Then a display like this will appear when the QR code has been scanned. The display that comes out if the animal is then able to issue what the animal sounds like at the blue volume and if pressed the blue volume then the application will automatically speak the animal's name.

Product Eligibility. The testing by media experts and material experts is a benchmark for the feasibility of learning media to measure the compatibility of media with the needs of blind people. Testing on experts aims to determine the legitimacy and feasibility of the “Smartness Help” Application product. This research and development were carried out by material experts and learning media experts.

Testing by material experts is carried out based on several aspects. *First*, the introduction is used to test all the instructions regarding what is in the application. *Second*, the feasibility of the content tests the suitability of the material. *Third*, the last aspect regarding language is to test the suitability of using language in the application.

Testing by media experts in this application focuses more on media display and application utilization. The aspect of the media display, tests the selection of writing and images in the application, while the application utilization aspect tests how the technique uses the application. The results of the validity and feasibility trials from media experts and material experts are summarized in Table 2.

Table 2
The results of the validity and feasibility trials of experts

Expert Validation	Percentage Rating Criteria	Specification
Theory	Very worth it (93.3 %)	<ul style="list-style-type: none"> • Clarity of study instructions • Clarity of steps in preparation for learning • Clarity of learning outcomes • The clarity of the description of the concept map of the material to be studied • Appropriateness of the content of the material can encourage children’s curiosity • Material equipment • The attractiveness of the content of the material • The suitability of the material with the learning objectives • Material suitability with children’s abilities • Appropriate presentation of the order of the material • Appropriateness of language used for the application • Compliance with good and correct Indonesian language rules (EYD) • Use language effectively and efficiently • The clarity of information displayed
Media	Very worth it (86.7%)	<ul style="list-style-type: none"> • The accuracy of choosing the type of text and fonts for writing in the application • The video display quality on text detection • Use of images in the application • The suitability of the use of colors in the image • Clarity of use of images in the application • Volume clarity on the app • Use of application content layout • Application display design • The menu presented is easy to understand • Sound or audio quality • Application creativity and innovation • The accuracy of the order in which the application is used • Sequence accuracy for accessing posts • Sequence precision for accessing images • The accuracy of the use of barcodes in image detection

Table 2 shows that according to the expert's assessment, the material can be categorized as very feasible with a score percentage of 93.3% and media experts say it is very feasible with a score percentage of 86.7%. Based on the results of this assessment it can be concluded that this initial product was declared feasible to be tested in the field on students. Even so, there were some inputs in the form of notes on the questionnaire provided by material experts and media experts.

Application Trial for the Blind. The integration and system testing, testing phase was then carried out on blind people. This test was conducted to determine the satisfaction of blind people with learning media in the form of a smartness help application for detecting writing and images. This is important to meet the needs of blind people in obtaining knowledge and information in the form of books and other printed media. Because blind people, as we know, blind people have limitations in their vision, which makes it difficult for them to carry out daily activities, especially activities in learning. The limitations of the blind are not a factor causing them to be unable to obtain knowledge and information in learning because the Smartness Help application can help them easily obtain knowledge and information in the form of books, print media, and whiteboards. So that blind people can easily access learning using the Smartness Help application that has been designed by researchers. This application has several functions that have been adapted to the needs of blind people in obtaining knowledge and information. Therefore, testing the use of the smartness help application was carried out on 31 blind people as test subjects for the smartness help application. The trial showed that as many as 87% of the responses of the blind to the "Smartness Help" application met the "very feasible" criteria. In general, the score that has been obtained indicates that the "Smartness Help" application that has been developed has the criteria of "very feasible". The results of this finding are the same as in previous studies which showed a positive response for blind people as users of the applications that have been developed.

Table 3
Frequency distribution of the scores of the blind people

Criteria	Score	Frequency	Percentage (%)
Very worth it	81 – 100	27	87
Worthy	61 – 80	0	0
Pretty decent	41 – 60	0	0
No wort it	21 – 40	0	0
Not feasible	0 – 20	0	0
Total		31	100

Discussion. Technological advances have had many positive impacts on everyone, including the blind (Khayati et al., 2020; Nurila, Rahmatullah, & Yuli, 2022). Technology can also be used by people with disabilities from various types of disabilities without exception, including blind people (Perianto, Pranowo, Noormiyanto, Hidayat, & Ciptadi, 2021). This application has two functions, namely the first can be used by taking a picture of the writing on the page of the book and the second can be used by highlighting the writing with the camera (Rizal & Triayudi, 2022) after doing these two methods this application will emit a sound or you You can call this application a translator that writes warnings in the form of

sound. The application can also read writing around children such as on walls, blackboards, banners, etc. The smartness help application aims to provide convenience for blind people in obtaining information alert posts and can detect images via qr scan in the application, this application has two functions.

First, it can be used by the method of taking pictures of text on book pages and can be used by the method of highlighting writing with the camera, then after doing both of these methods the application will emit a sound or you can term this application as an alert translator in the form of sound. Applications can read writing that is around children such as on walls, blackboards, banners, and others.

Second, by using image detection, in this way the application can detect the image you want to detect, through this application it can detect images by scanning the QR code provided in the application. For now, several image detection methods can be used, namely in the form of animal images, public area images, and vehicle images. The way this application works is that later the application will scan the QR code, then after that the scanned code will issue an image and sound (if it is an animal image) and will say the name of the image that has been scanned.

The system and software design stage of the researcher determines the needs of the child and performs the initial design of the application to be made, namely the smartness help application to be able to detect writing and images where the writing detection application can detect writing and images through a cellphone camera and can emit sounds and images highlighted by the application. Product design activities are carried out after knowing the learning needs of blind people obtained and the analysis stage. The design phase is carried out by determining the elements needed as a basis for development. The product developed is a media in the form of an application, namely the smartness help application. The smartness help application is used to obtain knowledge and information in the form of print media.

Application design and running strategy application design are carried out to determine the components and materials delivered through the developed application. Application components include appearance, application size, selection of image illustrations, and other elements needed for making applications. While the material provided is tailored to the needs of the blind and the application design is focused on obtaining knowledge and information for the blind so that the material obtained is by their needs.

The strategy for delivering subject matter using the smartness help application is carried out in several stages, starting with the delivery by the teacher in the form of work methods using the smartness help application. Next, the teacher discusses this with the children. After the children understand, each child is given a mobile phone so they can try their respective intelligence assistance applications with instructions and directions from the teacher.

After testing the application for the blind to meet their learning needs. In addition, this application can also improve the cognitive abilities of blind people in learning (Savira, Wagino & Laksmiwati, 2019; Yuwono & Mirnawati, 2021). Because the cognitive abilities of the blind are not so hampered because the cognitive abilities of children are the same as children in general, it's just that the blind are physically limited. So it is said to be able to help the cognitive abilities of blind people because through this application they can easily obtain knowledge or information through books or blackboards while doing assignments.

Not only cognitive abilities but blind people are also required to be able to think critically in learning to achieve a higher goal, namely building their thinking abilities of blind people.

The process of critical thinking is needed in learning, including for blind people. So that critical thinking skills are needed in the learning process so that blind people can understand the material and solve problems properly.

Through critical thinking later it can also lead to better communication skills for blind people. Communication skills are also a prerequisite in the academic field for blind people such as reading and writing (Handoyo, 2022; Mufida, 2021). Blind people need to master how to understand the meaning of reading texts and words spoken by other people because they lose their sense of sight. If the visual impairment's communication skills do not develop optimally, problems will arise in subsequent academic abilities. So blind people cannot convey ideas when they are in their environment because they are afraid of other people. Therefore, it is necessary to develop communication for the blind that involves the surrounding environment.

CONCLUSION

Based on the discussion regarding the smartness help application, it can be concluded that the supply of books translated into Braille is very limited, which means that the needs of the blind have not been fully met. So, researchers developed a smartness help application designed for the visually impaired in detecting writing and images to be able to gain knowledge in the form of books or other information media. This study uses material and media expert tests to be able to determine the feasibility of the application to be developed and tested on blind people. The results of testing on media experts 86.7% and material experts 93.3% show that this application is very feasible and can be tested on blind people.

It is hoped that later this intelligence assistance application can be used by blind people in meeting their needs. Because the limitations of the blind are not a barrier for them to be like other friends, they can still obtain knowledge and information easily with the Smartness Help application that has been designed by researchers so that their learning needs can be properly met and can be put to good use in obtaining the knowledge and information that blind people want to seek. Based on the results of trials on blind people, the results of testing the use of the smartness help application showed that as many as 87% of blind respondents to the application met the "very feasible" criteria. The overall score obtained shows that the "Smartness Help" application developed has "very feasible".

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