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Testing effectiveness of social mobility and communication orientation model using problem-based learning for the visual impairment students

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Abstract

This study aims to test the effectiveness of the social mobility and communication orientation model based *on* internet mobile application technology (IT-SMCOM) for problem-based learning in Universitas Negeri Surabaya (Unesa) campus environment. This research method measures the effectiveness of internet *mobile* application technology for problem-based learning in Unesa campus environment. The results of expert validation test data and performance tests were analyzed using a descriptive form of percentage assessment of the observer team. The test results of media product experts and practitioners scored 100% excellently, and Special Education experts scored 87%. Then the effectiveness test through main field testing five visually impaired students affected by the Covid 19 pandemic scored 93% excellent (1 person), a score of 75% good (2 people), and a score of 62% adequate (2 people). Operational field testing, ten people from the Indonesian visual impairment association group and the Surabaya and Sidoarjo inclusive high school groups scored 100% excellent (one person), score 94% very good (three people), score 81% good (one person) and score 81%-84% very good (three people), score 65%- 70% adequate (two people), The conclusion of the results of data analysis of expert validation tests, practitioners suggest that the product is feasible to be tested in the field. The product effectiveness test shows that the product trial results depend on the development of the behavior and characteristics of each individual with visual impairment.

Keywords: visual impairment, social, mobility, orientation, communication

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1. Introduction

Universitas Negeri Surabaya (Unesa) takes part and plays a significant role in national development in the field of education. Referring to the vision of Unesa, which is superior in education. This realization is following the main competencies and capacities of a disability-friendly campus. The picture of a blind person has limited vision and movement in the surrounding environment. Despite the lack of vision, the introduction of the environment is a manifestation that he can do activities like ordinary people. It helps to overcome the problem of understanding the campus environment comfortably, safely, and happily, and dare to walk independently. Product Internet mobile application Technology of Social Mobility and Communication Orientation Model (IT-SMCOM) based on an android application for problem-based learning to understand the concept of Unesa campus environment as an alternative solution to facilitate blind people.

Visual impairment. Cole, P. & Lorna, Chan. (1990); Widjaya, A (2012); Kemendikbud. (2014) states that blindness can result in three forms of limitations; these include 1) a lack of focus and poor judgment, 2) a lack of interaction with the environment, and 3) a lack of orientation and mobility. Unesa campus conditions have a different landscape for each building from each of the eight faculties.The variety of Unesa campus facilities requires an understanding of the introduction of different building concepts to make the independence of visiting when visiting for blind people. Understanding the introduction of the outdoor environment by finding landmarks/terrain characteristics and campus environment clues as an illustration of model development. Support from Heinich, Molenda. (1999); Bakri. (2011); Nandi (2016) says multimedia can be any combination of two or more media formats integrated into a program that provides information or instructions. Android applications form mobile learning devices as one of the social communication tools developed for people with visual impairments, Mason & McCAll. (2013); Lahav, O and Mioduser, D. (2002); J. Ismaili, (2017).

In everyday life, humans are inseparable from reciprocal relationships with the surrounding environment, both the socio-cultural and physical environment. To interact with the surrounding environment, humans need support from their senses, such as Senses of taste, touch, smell, hearing, and all five other senses. Although they have different functions and characteristics, the five senses work together in synergy to get a complete understanding or meaning of the surrounding environment. The eyes play an essential role in capturing information from outside, which the brain will then process into knowledge and experience. Then, that knowledge and experience is the end of a person doing various activities in his daily life, especially for the visually impaired.

One side of the current era is the ease of human activities without the exception of those with disabilities the use of internet scaffolding mobile application technology is very clear and makes all activities faster. SmartCane device by Hapsari, et al. (2017), uses GPS (Global Positioning System) to identify potential impediments and alerts the user with different vibration patterns and intensities (touch-vibration feedback). It allows the user to avoid below-the-knee drag and fits over the fold of a traditional white cane. Although it is cheap, it could be more effective for tasks requiring localization or pathfinding. BlindAid Program RFID (radio frequency identification) tags were puting at different important building places, according to Rao et al. (2015). This tag is used by specially created ETA (Estimates Time Arrival) devices with RFID sensors to identify the user's present location. Software components in the gadget additionally utilise this GPS location data to produce directional auditory

feedback to guide the user to their goal. For orientation studies, Pamuji et al. (2022) showed that a smartphone narrating the path through the starting point can be used effectively as a non-visual navigational aid. The majority of users, according to the author, prefer this approach because they can independently figure out how to get around campus buildings.

The complicated mapping technology, inaccurate route indication, and lack of current location indication. Are the primary issues with the current system.. The application we propose is the development of Pamuji, et al. (2022). Presenting a navigation system from Google Maps that makes users comfortable traveling in the Unesa campus environment with updated routes through voice narration. This is to support the advancement of internet network-based technology in carrying out daily life activities as the needs of every individual, especially the visually impaired, using a hand phone. The linkage of internet design of android mobile learning application technology in handphone packaging as a guide for independent travel for blind people to various places of existence in the Unesa campus environment. This design is equipped with a route to each building facility of the two Unesa campuses, both Lidah Wetan and Ketintang, making it easier to recognize each faculty building intended for the blind community. IT-SMCOM is equipped with braille and lay writing guidebooks with the support of embossed maps in readability to recognize the blind community Unesa campus. Digital technology in the android mobile learning application system is used for the orientation model of social mobility and communication to visit various places available on the Unesa campus environment according to the needs of the blind community. This research aims to test the effectiveness of the social mobility and communication orientation model based on internet mobile application technology for problem-based learning in the Surabaya State University campus environment.

Mercer & Mercer. (2014); B. Jatmiko, et al. (2018), regarding learning problem solving as a learning model, is based on problems based on essential competencies that students are learning. Then Mercer, Cecil D & Mercer Ann R (2014); and Ngalimun (2014), namely problem-based learning can help kids tackle genuine problems from everyday life to encourage higher-order thinking skills. It follows that problem-solving learning as learning that presents problem-oriented material is appropriate and can be encountered by students in real life. This mainstreaming will gain knowledge, have skills in solving problems faced by learners. Then the learner becomes a facilitator so students can seek as much knowledge as possible. Furthermore, Sunanto, (2005); Salleh & Laxman, (2015); Andajani & Wijiastuti, (2020), found that at least to be said to be a group in one group, there must be two people. In one group consists of students who have different or equal academic abilities. Each group member will influence each other because there will be an interaction between group members.

Instilling mastery is developing the initial knowledge that a person must have because it is the basis 1for formulating principles in everyday life, this is emphasized by Effendi, (2009) and Depdiknas, (2014). Instilling good mastery of initial knowledge can help the application continue with more complex concepts. Meanwhile, with the understanding of the idea of students' ability to master science, one of which is the learning material given in everyday life. Something potential is owned in understanding a place of objects, events, activities, and relationships with exact attributes.

The opinion of Aldridge & Goldman, (2002), that the benefits of solving learning problems to understand environmental concepts include enabling learners to engage with the environment in

learning various things, including: 1) can learn about real-world problems, 2) can hone problem-solving skills, 3) can learn independently, 4) students can learn to dig for information, and 5) can learn to improve communication skills.

2. Methods and Materials:

To test the efficacy of the IT-SMCOM product based on internet mobile application technology for problem-based learning in the Unesa campus environment, this research is development research with a research and development (R&D) approach to the Gall model, Borg, W.R. and Gall, M.D. (2003) and Sugiyono (2015). utilizing the operational field testing, main field testing, main product modification, and preliminary field testing stages. Below is Figure 1, product testing research on the development of Internet mobile application technology learning model

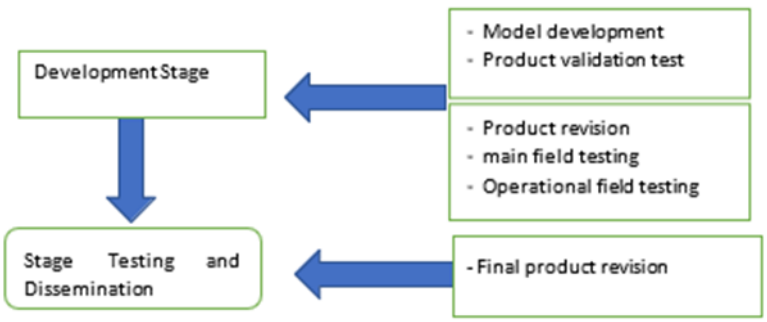


Figure 1. Schematic testing of it-smcom product mobile learning application understanding the unesa campus environment for visually impaired using problem-based learning people.

The development stage includes a development model in the form of the IT-SMCOM application, which is then carried out product validation tests by media experts, users, and practitioners, after which product revisions are carried out, the application that has been repaired is carried out main field testing by blind students of Unesa affected by the Covid 19 pandemic and operational field trials by the Pertuni community and blind inclusion schools. Then the testing and dissemination stage by users getting to know the Unesa campus environment by downloading the link https://unesa.me/ApplicationOMSKunesa and installing it according to the following guidelines https://unesa.me/PanduanOMSKunesa so that it can be used for blind people around the world who want to get to know university campus environment

Product effectiveness trials in development research include: (1) validation test design, (2) test subjects, and (3) types of data, among others.

a. Validation Test Design

IT-SMCOM mobile application learning using problem-based learning to understand the Unesa campus environment for blind people in the general public in this study has a high feasibility level. In addition to conducting this series of product validation tests, adjustments based on the

validation test were also made. An examination of media experts' work served as the validation test. blindness experts, as well as a practicality test.

b. Test Subject

In the product trial, IT-SMCOM mobile application learning using problem-based learning to understand the Unesa campus environment is centered on the visually impaired community, namely, students affected by the covid 19 pandemic, the Indonesian Blind Association, students of Inclusive High Schools in Surabaya City and Sidoarjo Regency. The methods to acquire data for this study used (1) questionnaires and (2) *performance* tests.

1) The questionnaire method is employed to collect data through the identification of needs, and assessment of information technology experts, media experts, practitioners, and users as material to improve the product of IT-SMCOM as an assessment of the feasibility of product models from special education experts.

2) *Performance* test

This is used to acquire the results of the demonstration of the use of products IT-SMCOM mobile application learning using problem-based learning to understand the introduction of the outdoor campus environment for visually impaired people visiting Unesa.

$$\rho = \frac{\sum xi}{\sum n} x\ 100\ \%$$

Figure 2. The formula for performance test, (Sugiono, 2015).

This qualitative and quantitative descriptive data from the review are processed using analytic data techniques. Results of experts, practitioners, and users of the blind community. This analysis is a step to classify qualitative data information in the form of input, responses, criticisms, and suggestions for improvement, as well as quantitative data that has been presented through a survey. The outcomes of this analysis are used to revise the product of IT-SMCOM by processing qualitative data. Quantitative data to measure the results of the validator's assessment of increased product use obtained through a questionnaire were analyzed using a descriptive percentage form, the following formula. The factors considered when making decisions from the product assessment of IT-SMCOM using problem-based learning both validator assessments, practitioners, and users of the blind community are described, Sugiono (2015) in table 1, below.

Table 1. Qualitative Conversion Assessment Criteria

Achievement Level	Qualification
91%-100%	Execellent
80%-89%	Very Good
65%-79%	Good
55%-64%	Adequate
0%-54%	Poor

3. Results /Findings

IT-SMCOM uses problem-based learning to understand the concept of UNESA campus environment for the visually impaired community to go through the development process stages. The stages of the development process that are carried out require conformity with the rules of the existence of theory and field review. If the appropriate stages of the development process are taken, a representative product will be produced based on the requirements of those who are blind. The initial stages were carried out in preparation for the manufacture of products through field studies and reference support both indexed national and international reputable journals and books related to ICT and blind people. Then the direction of this development refers to the Gall, Gall, & Borg model (2003) and Sugiono (2015), preliminary field testing, main product revision, main field testing, and operational field testing.

a. Preliminary Field Testing

IT-SMCOM on android applications using problem-based learning to understand the concept of Unesa campus environment in the blind community is carried out validation tests by Informatics Engineering experts/media experts, experts in Special Education for the Blind, and practicality tests by Special High School teachers with blindness. This validation test is implemented to obtain an assessment and feedback as the foundation for product revision. This expert validation test and practicality test are the beginning of the product assessment of IT-SMCOM that has been produced. This stage seeks to evaluate the product feasibility of the IT-SMCOM understanding of the external campus environment using problem-based learning for blind people visiting Unesa. Understanding the concept of the Unesa Lidah Wetan and Ketintang campus environment in the blind community.

Mainstreaming before testing the product IT-SMCOM was tested for validity and practicality by experts, users, and practitioners by obtaining an assessment and validation of feasibility through quantitative description analysis using percentages. In connection with this feasibility test, the research team held a discussion meeting with PLB experts in visual impairment, informatics engineering, users, and practitioners of special high schools with visual impairment to provide input and suggestions. The results of the implementation of the feasibility test group discussion obtained an understanding, among others:

1) Renaming the department for learning development and quality assurance building to department for learning development and assurance
2) Steps to install the app and ensure it is saved on the user's android device
3) practice opening the application and learning the steps
4) carry out the application to completion
5) Providing feedback on user test results
6) Users and practitioners fill out an instrument to assess the internet of application

In addition to evaluating the product's viability, special education specialists in visual impairment, media experts in the informatics engineering department, users, and practitioners of special high school with Visual Impairment have prepared instruments in the form of questionnaires. The validator's job is to evaluate the data by responding to a sequence of assertions that already

exist and to add feedback on the form in the form of criticism or suggestions. That has been provided. Two experts act as validators and two people as users and Special High School practitioners. Expert assessment of the product IT-SMCOM is in line with the clarity of the flowchart component of the assembly system. The use of scaffolding and a series of mutually assembled networks with the power of internet technology and the clarity of the final product used by blind people. The outcomes of the validator's qualitative description input are shown below..

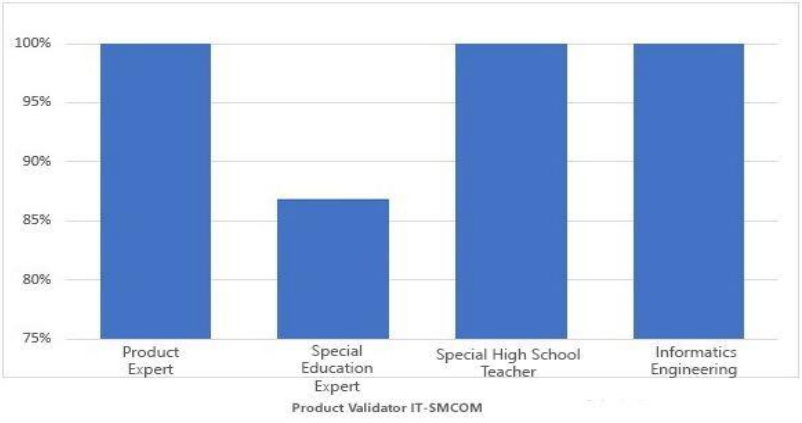
1) Correct the content of the name of the department for learning development and quality assurance building to department for learning development and assurance
2) Add rewind feature
3) Clarity of travel points and destinations into each route within the Ketintang and Lidah Wetan campus neighborhoods.

The linkage of validator assessment data analysis gave each evaluation item a score. of 100% for media experts and a score of 87% for special education experts in the field of visual disabilities.

This practicality test linkage is appointed as a user whose job is to assess the suitability of the IT-SMCOM with the needs of the visually impaired community. Assessment of practicality in grasping the idea via problem-based learning of environmental suitability of road access, and travel route guidance to get to know the environment of two campuses for the visually impaired community.

The acquisition of user assessment results scored 100% and special high school practitioners of special schools for the visually impaired scored 100% with the level of validity table. This means that the feasibility findings assessment from expert validators in the field of media and the field of special education, users, and practitioners of special high school for the blind get very feasible results and are used in field trials on both a small and large scale. The findings of the analysis are displayed in table 1 below of expert, user, and practitioner assessments for the IT-SMCOM.

Table.2. Results of expert, user and practitioner assessment analysis for IT-SMCOM



Then the support of the guidebook for the use of IT-SMCOM UNESA environment travel routes, and the accuracy of clues as clues, in the form of this android application studied by the community of blind people as users. Furthermore, this guidebook through the evaluation's findings of the

feasibility level of the validators who have provided input and suggestions for use by the community of people with visual impairments as users.

b. Main Product Revision

The IT-SMCOM through expert, user tests and practitioners, then the product that has received input and suggestions. Revision of the first draft or product is based on validators' evaluations, remarks, and recommendations by media experts and Special Education experts with visual disabilities, while users and practitioners by Special High School teachers with visual disabilities. Based on the revision of the draft I product, reporting to the *experts* in their respective fields was carried out to convey the results of improvements through clustered discussions. The results of revising the IT android application product against draft I in draft II by validators, users, and practitioners will be corrected again.

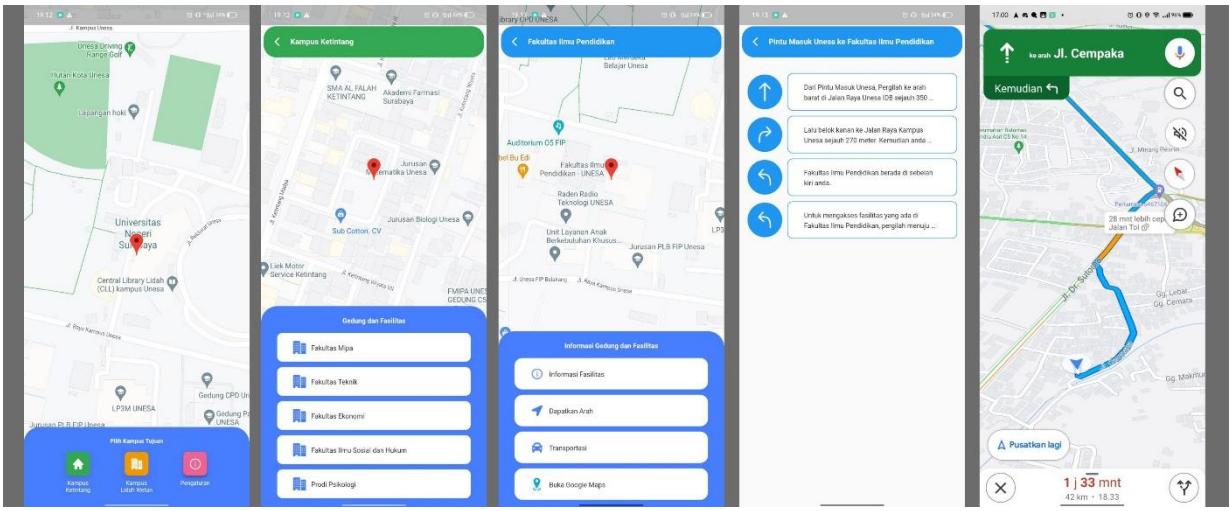


Figure 3. IT-SMCOM interface

IT-SMCOM has a homepage display with three buttons: the Ketintang Campus, the Lidah Wetan Campus, and Settings. The menu contains buildings on each campus, users can choose the building they want to go to or study because it is equipped with features including: building information, containing narratives of existing facilities in specific departments; get directions, pops up narration of directions from the gateway toward the selected building; transportation, opening an online transportation application to assist mobility from one building to another; open google maps, in order to find out the user's accurate location from a location that is not reachable by the application, for example, from home with the help of Google Maps GPS

After examining the product, the validator provided input and recommendations based on the outcomes of modifying draft II of IT-SMCOM. The results of the correction of media experts, Special Education experts in the field of blindness, users, and Special High School practitioners, state that the product can be used for the main field studying the idea of the Unesa campus environment using the method of problem-based learning for the blind community. Likewise, the product was tested in Operational field testing in the community of people with visual disabilities.

Using draft II as the finished product revision, it means that the revised product of the IT-SMCOM is extremely practical and ready for usage by the blind community in understanding problem-based learning to get to know the Unesa environment. Following table 3, revision of draft 1 in draft II of the android application-based by Media Experts, Visual impairment specialists in special education, Users and Special High School Practitioners.

Table. 3. Product Revision of IT-SMCOM by media experts, plb experts in the field of visual disability, users and smalb a practitioners

No	Revised	Media Expert Draft I	User Draft I	Practitioner Draft I	Draft II
	Added instructions for use	The android application uses a voice system, so that it is easy to do for future development such as adding and changing facilities, facilities, and equipment existing infrastructure	Color Change option for low vision	Color Change option for low vision	Has been improved according to feedback from validators and users and practitioners
	Color Change option for low vision	The narration voice does not use the original recorded voice because it will crash with the android screen reader (Talkback)			
	Change the name of Building LP3, CPD, Library	The application is designed to be easy to make changes (updates) such as the name of the building and information on facilities, infrastructure, so that future developers who have application files can make periodic changes (updates) periodically. Standalone			
	We are adding building information at the Lidah Wetan campus, among others. Rectorate information for each floor Improvement of Containerized Kos information Unesa Central Library is another name for Library d.Postgraduate Building, another name for CPD e. Merdeka Belajar Laboratory, (in the form of land open to students)				

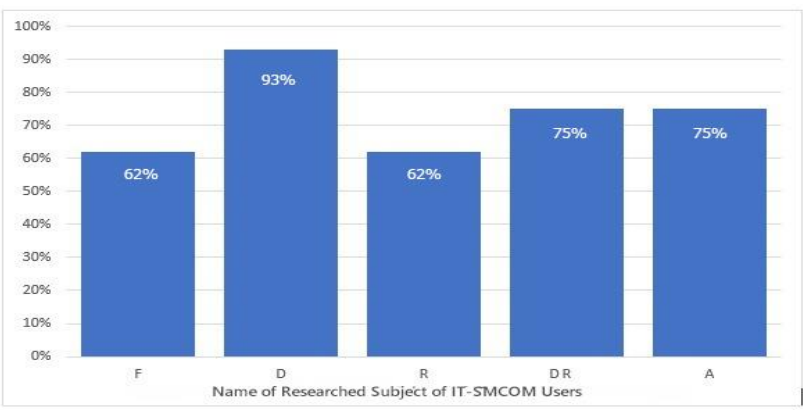
c. Main field testing

Main field testing as a test of the effectiveness of the resulting product after improvements from validator input and suggestions. The effectiveness test was conducted through a primary or small-scale field trial for the disabled community blind students affected by the Covid 19 pandemic. In light of the outcomes of the primary field trial or small scale, the community of students with visual impairment affected by the pandemic COVID 19 as a user needs those who have flying hours high in self-management. The following figure.1. test results of the IT-SMCOM using To comprehend the idea of the Unesa campus environment, use problem-based learning.

Figure. 2. Testing the IT-SMCOM using problem based learning understanding the concept of unesa campus environment.

The results of the assessment during the trial process through observations made by the research team by filling out the instrument show the acquisition of data for each community of blind students affected by the Covid 19 pandemic, namely named initials F score 62%, D score 93%, R score 62%, DR score 75%, and A score 75%. Following table 4, the acquisition of the findings of the data analysis and the evaluation of the study team during the observation process through the main or small-scale field trials for the community of visually impaired students affected by Covid 19 in using the IT-SMCOM.

Table.4. Results of Data Analysis of Researcher Assessment During the Trial Process by Observing the Use of the IT-SMCOM Program in the Small Scale Test.



Relevance of the main or small-scale field trial that the community of people with disabilities blind students affected by Covid 19 as users of the Internet Application technology in its implementation is supported by the readability of the embossed map of the campus environment, both Lidah Wetan and Ketintang Unesa, along with the results of inputs, among others.

1) Users appreciate the embossed map that supports the android application to are the results understand the concept of the Ketintang and Lidah Wetan campus environment,

2) However, after studying the constraints of braille writing the names of buildings are less legible for those who are less sensitive to touch.

3) The use of tusing could be more familiar to users.

4) The coding of each building has yet to explain the name of the folder arising from the realization of the campus environment.

5) The road at Ketintang campus is too narrow compared to Lidah Wetan campus, so it is easier to recognize Lidah Wetan campus.

Below figure.2, the implementation of the embossed map test for readability of the Ketintang campus environment and Lidah Wetan of Unesa at blind community students affected by the pandemic covid 19 the SMCOM.

Figure. 4. Implementation of understanding map arising in the blind community of students affected by the covid pandemic 19

d. Operational field testing

The implementation of the operational field test was carried out in two stages, namely.

1) test of users with visual impairments from the Pertuni community (Indonesian Blind Association),
2) test users with visual impairments in inclusive high school groups in Surabaya and Sidoarjo. The Operational field testing results are described below:

1) Visually Impaired Community Pertuni (Indonesian Blind Association)

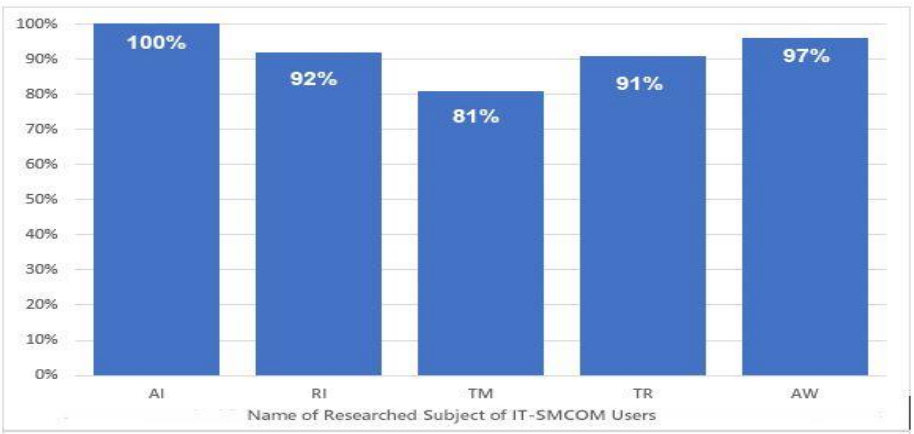
Based on the results of the main or large-scale field trials the community of the blind who are also part of Persatuan Tunanetra Indonesia (Pertuni) as users of *android* applications need to have

high flying hours in traveling independently. Figure 3 of the results of the SMCOM android application trial for understanding the concept of the Unesa campus environment through problem-based learning.

Figure 5. Operational field testing of the IT-SMCOM using Problem-based learning Understanding the Unisa Campus Environment Concept for the Pertuni Blind Community

The results of the assessment during the operational field testing process phase I through observations made by the research team showed the acquisition of data analysis for each pertuni (Persatuan Tunanetra Seluruh Indonesia) blind community, namely named initials AI scores 100%, RI scores 94%, TM scores 94%, TR scores 81%, and AW scores 94%. The data analysis shows an increasing change compared to the main field testing. Following table 5, the findings of the data analysis of the evaluation of the product trial process when using the IT-SMCOM understand the notion of the Unesa campus environment through problem-based learning with observations of operational field testing for the Pertuni blind community.

Table 5. Results of Data Analysis of Assessment During the Trial Process with Observations of Researchers Using the IT-SMCOM in Operational field testing for the Pertuni blind community.



The linkage of Operational field testing that the Pertuni community of blind people as IT the readability of the embossed map of the campus environment both Lidah Wetan and Ketintang Unesa, the following input results among others supports users of this android application in its implementation.

1) Users appreciate the embossed map that supports android applications to comprehend problem-based learning and grasp the idea of the Ketintang and Lidah Wetan campus environment, but after studying the constraints of braille writing of building names are less legible for those who are less sensitive to touch.
2) The coding of each building has yet to explain the name of the folder arising from the realization of the campus environment.

The road at Ketintang campus is too narrow compared to Lidah Wetan campus, so it is easier to recognize Lidah Wetan campus. Below is the implementation of the product trial of the embossed map for reading comprehension in problem-based learning to recognize the Unesa campus environment in the Pertuni blind community.

Figure 6. Implementation of embossed folder understanding in the pertuni blind community

2) Visually Impaired Inclusive Schools

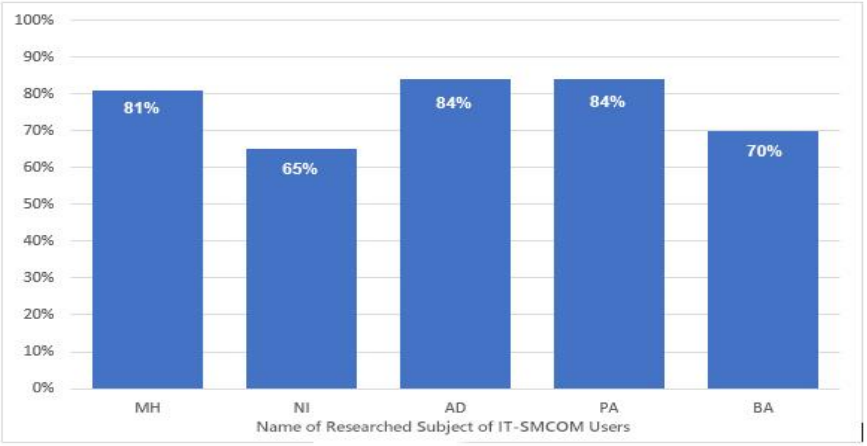
Users of blind people from Inclusive High Schools in Surabaya and Sidoarjo carried out operational field testing. Based on the main or large-scale field trial results, the community of blind people with stage II inclusive high school students in Surabaya City and Sidoarjo Regency as IT users of *android* applications need it as a discourse on understanding universities in traveling independently to get to know the campus. Figure 5 shows the results of the problem-based learning used by IT-SMCOM to better comprehend the Unesa campus setting.

Figure 7. IT-SMCOM operational field testing utilizing problem-based learning understanding the unesa campus environment concept for the blind high school inclusive community in surabaya and sidoarjo.

In connection with the trial above, the blind community of inclusive high schools in Surabaya and Sidoarjo in caring for themselves using the IT-SMCOM as needed in solving learning problems to understand the concept of the Unesa environment. An environment that has never been known as a problem is immediately resolved to orient social mobility and communication in continuing education in the future. On the one hand, the need for communication information technology through mobile learning packaged in a *hand phone* can solve the learning problem of SMCOM to recognize the environment that has never been visited by the blind community of Inclusive High School students. Understanding the concept of the environment in solving the learning problem model requires updating through the *Google website* to recognize the conditions of the new place.

The assessment during the Operational field testing process phase II through observations made by the research team showed the acquisition of data analysis for each community of blind people with inclusive high school in Surabaya and Sidoarjo, namely initials MH score 81%, NI scores 65%, AD score 84%, PA scores 84%, and BA scores 70%. Based on the data analysis, it shows the balance of results between one individual and another when performing the issue of figuring out how to navigate the college atmosphere of blind inclusive high school from the assessment of the research team to apply the product. The data analysis outcomes are displayed in table 6 below the research team's assessment during the Operational field testing process for the community of visually impaired Inclusive High School using the IT-SMCOM.

Table 6: Findings from the Data Analysis on the Evaluation of the Trial Process with Researcher Observations of the Use of the SMCOMAndroid Application Program in Operational field testing



for the Blind Community of Inclusive High School Learners

The linkage of Operational field testing phase II that the community of blind Inclusive High School as IT users of the SMCOM *android* application. This trial is the implementation of support in the readability of the embossed map of the campus environment at both Lidah Wetan and Ketintang Surabaya State University, the following input results include.

1) Users appreciate the embossed map that supports IT android applications to recognize the idea of the Ketintang and Lidah Wetan campus environment and problem-based learning. However, after learning it is constrained by braille writing (tusing) which has never been studied in inclusive schools.
2) Users need help with the legibility of recognizing the names of buildings with braille writing for those who lack tactile sensitivity.
3) The coding of each building has yet to explain the name of the folder arising from the realization of the campus environment.
4) The road at the Ketintang campus needs to be narrower than the Lidah Wetan campus, making it easier for users to recognize the Lidah Wetan campus environment.

Below is figure 3, the implementation of the product trial of the embossed map for the readability of understanding in *problem-based learning* about the Unesa campus environment in the community of visually impaired high school students Inclusive SMCOM.

Figure 8. Implementation of Embossed Folder Understanding in the Community of Visually Impaired Learners at an Inclusive High School

4. Discussion

In the current development, the increasing interest in technological adaptation of the use of *android* application *smartphones is* very rapid, making the learning process faster and more effective as a handheld device for every human being. One of these is the IT-SMCOM, which utilizes problem-based learning, is aware of the Unesa campus setting, and produces products tested on the blind community. Testing this product that has been feasible through the acquisition of data analysis, input, and ideas from the updated validator's assessment results. The product test target of the IT-SMCOM is classified in the blind community, namely 1) students affected by covid 19 who study online have never come to the Unesa campus, 2) a collection of the Surabaya branch of the Indonesian blind association, and 3) students who study in an inclusive high school environment in Surabaya and Sidoarjo understanding of the concept of the Unesa campus environment produces products that have been tested on the blind community. Testing this product that has been feasible

from the updated validator's evaluation results through the data analysis, input, and advice collection.

This classification is emphasized by Sugiyono (2015) and Gall, Gall, and Borg (2003), that the feasibility of the product is tested through, 1) main or small-scale field trials, and 2) natural or large-scale field trials. Then the main or small-scale field trials targeted students with visual impairments affected by covid 19 who attended online classes that had never come to the Unesa campus. While the real or large-scale field trial was carried out two times with different targets, namely the Surabaya branch of the Indonesian Association of the Blind and students studying in the Inclusive High School environment in Surabaya and Sidoarjo. The trial conditioning was conducted to realize the need for self-actualization of IT-SMCOM for the blind community.

Tay, Louis, and Ed Diener (2011) imply that self-actualization—as opposed to the other four—can be attained before the other wants are satisfied in a society where needs are supplied. This suggests that reaching self-actualization is significantly more likely if the most fundamental requirements are addressed. Affirmation of the idea of the 4.0 era has the potential to be an opportunity to realize the environment as a solution to learning problems for the visually impaired. One of them is the design of *mobile learning* applications to understand the Surabaya State University campus environment to facilitate the visually impaired community. Al Tabany, 2017, that the modeling component to understanding the material provides an explanation based on the results of experiments or discoveries with realia media and group discussions for learners.

The relevance of the effectiveness of application products is obtained through data analysis of the results of validator assessments of all items, getting a score of 100% for media experts and 87% for professionals in the subject of visual impairment from special education. The acquisition of scores from users scores 100%, and special high school practitioners of special schools for the blind give a score of 100% with the table of validity levels. This demonstrates that the findings of the feasibility evaluation from the expert validator in the fields of visual impairment, media, and special education, users, and practitioners of special high school blindness get very feasible results. This means that the IT-SMCOM using *problem-based learning in* understanding the concept of the Unesa campus environment for blind people can be used in field trials on both a small and large scale.

Heinich's affirmation, Molenda, Russel(1999), says packaged interactive media refers to different arrangements of two or more media types built into educational or informational presentations. Based on the effectiveness test of the IT-SMCOM comprehending the idea of the Unesa campus environment through problem-based learning by the blind community through filling out a questionnaire of the research team's observations, consisting of 1) the use of the IT-SMCOM product *by the* blind community*,* 2) the assessment of the research team when using the IT-SMCOM by the blind community and 3) the use of the braille embossed map by the blind community. The test shows that blind people can be independent in doing activities, communicate and interact by optimizing their verbal aspects. The fundamental emphasis is that blind people are possible to do anything independently as non-disabled people do. This is as long as the blind are given proper accessibility and accommodation, especially as a right, citizens of the nation.

Then the assessment of the research team on the use of IT-SMCOM from users of the blind student community affected by the Covid 19 pandemic during the experiment showed five people each, showing the results of 1 person scoring 93% excellent, two people scoring 75% good, two people

scoring 62% adequate. This means that students with less potential results have not mastered access from the Unesa campus environment both in Ketintang and Lidah Wetan. The need for tactile mastery of the embossed map for the readability of the Ketintang and Lidah Wetan campus environment of Unesa measures students who get enough and less good results.

The results of the experimental test for the assessment of the research team for the use of the IT-SMCOM product from users of the Pertuni blind community, showing five people each, showed that four people scored 90%-100% excellent and one person scored 81% very good. This means that the results of the assessment of the research team for users of the Pertuni blind community are excellent, with very good independence in mastering access Unesa campus environmental facilities in Ketintang and Lidah Wetan. Then the implementation of the use of embossed maps of the Lidah Wetan and Ketintang Unesa campuses by users of the blind community of Pertuni, shows that the measurable mastery of tactile sensitivity understanding the embossed map for the readability of the Ketintang and Lidah Wetan campus environment of Unesa.

Based on the third experimental test of the IT-SMCOM product through the experimental test assessment of the research team on the IT-SMCOM product, showing five people each, it shows that three people score 81%-89% very good, and two people score 65%-70% good. This means that the results of the trial assessment of the blind Inclusive high school community in Surabaya and Sidoarjo obtained good and quite good in mastering access to facilities to address issues with learning on the UNESA campus Ketintang and Lidah Wetan. Implementation of the use of map embossed campus Lidah Wetan and Ketintang Unesa by users of the community of blind people with inclusive high school in Surabaya and Sidoarjo, shows that the findings of the condition of blind people with inclusive high school depend on the existence of characteristics in the development of the behavior of each human being. Cole, P.& Lorna, Chan. (1990), Widjaya, A (2012), and Kemendikbud. (2014), states that blindness can result in three forms of limitations, namely: (1) imitations in concepts and experience diversity; (2) restrictions in engaging with the environment; and (3) restrictions in orientation and mobility.
In additionself-actualization is the highest degree of need that people have. Self-actualization is difficult for individuals to achieve since, in order to do so, they must be capable of high performance and possess a developed, multifaceted personality. Like the current digital era, assistive technology for blind people has developed well for the use of the internet as a vehicle for socializing and communicating. However, it depends on the courage and independence of each individual, especially blind people.

Closely related to solving learning problems to understand the unesa campus environment using the IT-SMCOM from the data findings of the test results measured through the mastery of the acquisition of results between excellent, very good, good, adequate, and poor. This means that learning readiness has a vital role in the process of success and characteristics, as well as adaptability in their respective lives. Aldridge's . J; Goldman, R. (2002) opinion, that the benefits of solving learning problems to understand environmental concepts include allowing learners to engage in learning various things, including: (1) can learn about real-world problems; (2) can learn problem-solving skills; (3) can learn independently; (4) Learners can learn to dig for information; and (5) can learn to improve communication skills.

5. Conclusion(s)

Based on the findings of the tests conducted by experts and users of media products, the score is 100% excellent, and the Special Education expert scores 87%. Then the effectiveness test through main field testing five visually impaired students affected by the Covid 19 pandemic scored 93% excellent (1 person), a score of 75% good (2 people), and a score of 62% adequate (2 people). Operational field testing of 10 people from the Indonesian Blind Association group and the Surabaya city and Sidoarjo Regency Inclusive High School groups scored 100% (1 person), score 94% (3 people), score 81% (1 person), and score 81%-84% (3 people), score 65%-70% (2 people), the conclusion of the data analysis for the expert validation test findings, practitioners suggest that the product is feasible to be tested in the field. The product effectiveness test shows that the product trial results depend on the development of the behavior and characteristics of each individual with visual impairment.

6. Recommendations/Future directions

The IT-SMCOM using problem-based learning in Unesa campus environment for the visually impaired community. Considering the findings above, the suggestions are directed in terms of utilization.

a. All audiences of developers and empathizers in Special Education can provide practical experience to get to know a disability-friendly University campus.

b. In general, it can be studied by organizers of Inclusive schools and Special Schools for the Blind throughout Indonesia and foreign communities who wish to pursue further education at Unesa.

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