Fingerprint-based Presence Application for Children with Disabilities

Mohammad Syahidul Haq
Educational Management Department
Universitas Negeri Surabaya
Surabaya, Indonesia
mohammadhaq@unesa.ac.id

Bambang Dibyo Wiyono
Guidance and Counseling Department
Universitas Negeri Surabaya
Surabaya, Indonesia
bambangwiyono@unesa.ac.id

Abstract—The development of fingerprint-based presence applications for children with disabilities aims to improve the efficiency and effectiveness of institutions in managing the system of attendance or presence. The development of a fingerprint-based presence application for children with disabilities uses a procedural model development research design. The research design of the development of procedural models is a descriptive qualitative research design that uses steps that must be followed to produce a product. The procedural development model must include several stages so that the resulting product can be developed optimally. The steps taken in the procedural method are preliminary study, development, and testing. The results of this product development provide several implications, namely the development of science and technology, managers of institutions or organizations and also for children with disabilities. First, the implications for the development of science and technology. Second, the implications for managers of institutions or organizations. Third, the implications for children with disabilities themselves.

Keywords— fingerprint; presence; children; disabilities

I. INTRODUCTION

The agenda of bureaucratic reform applied is to utilize the development of information, communication, and technology adopting various communication and information media to serve public sector activities. This idea is driven by the reason that the use of ICT has long been believed to improve the quality of governance and provide public services. [1]

In line with the development of science and technology which leads to globalization and modernization in a complex manner, resulting in the development of various advanced technologies that can increase the productivity of Human Resources (HR). The development of science and technology also directly affects the equipment in the institution, one of which is the presence system (presence) is also not immune from the impact of this. Presence system has been developed based on electronic-based applications or what is currently known as fingerprints. Fingerprint is an electronic device that uses scanning sensors to find out someone's fingerprint for the purpose of verifying the person's identity. [2]

This fingerprint sensor is now widely used in electronic equipment such as entrances, smartphones, employee absences and various other electronic devices that must have a high level of security and should only be accessed by people who have permission. Fingerprint-based attendance or attendance technology is booming and very supportive because its application is not too difficult and also affordable so many educational institutions apply the fingerprint application [3].

Current technological advances force stakeholders in various parts of the world of education to be able to follow it. Without exception academic institutions and staff must contribute to it. That all activities in the world of education can be accessed properly and the latest one that must be taken is to use management information systems in education, especially in the administration of education personnel [4]. One form of application of fingerprints for presence activities in the world of appropriate education is for children with disabilities. Disability in the Big Indonesian Dictionary is referred to as "person" which is defined as a person who has or has suffered something. Disability is a minority group in our environment both educational and non-educational institutions. Their existence is often underestimated and lacks the attention or treatment that suits their needs. In the development of fingerprint-based attendance applications for children with disabilities it is expected to provide services that meet the needs of children with disabilities and increase efficiency and effectiveness within the scope of the attendance system.

The development of fingerprint-based attendance applications for children with disabilities can be applied in special educational institutions or special education and can also be applied to institutions that are providers of disability services [5]. The accuracy of the presence with this fingerprint is indeed no doubt because it uses fingerprints. Fingerprints are genetic traits that differ from one person to another. That way, the level of error or forgery in detecting someone's identity is very small. In addition, the fingerprint application developed for children with disabilities will certainly help the child to make it easier to fill in attendance or attendance. Children with disabilities do not have to bother writing or

signing, which for certain disabilities will be very difficult to do because of the limitations they have. In addition, educators and non-educators will certainly be greatly helped by this fingerprint-based presence application.

The theoretical objectives of developing a fingerprint-based presence application for children with disabilities include, among others, (1) describing the fingerprint-based presence application system; and (2) analyzing the design of fingerprint-based presence application development for children with disabilities. The practical objective, of course, is to facilitate the management of presence systems in the institution and also improve the efficiency and effectiveness of the performance of human resources in an institution by minimizing fraud in the presence system.

II. METHOD

The development of fingerprint-based attendance applications for children with disabilities uses a procedural model research development design. The research design of procedural model development is a descriptive qualitative research design that uses steps that must be followed to produce a product [6]. The procedural development model must include several stages so that the resulting product can be developed optimally. The steps taken in procedural methods are preliminary studies, development, and testing.

III. RESULTS AND DISCUSSION

A. Presentation Device

The development of fingerprint-based presence applications requires several important tools for practical development in the field. The following devices are required:

1) Finger scanner: is an electronic device that is used to capture digital images of fingerprint patterns. This image is called a live scan. Live scanning is digital processing to create a biometric template that is stored and used for matching. This is an overview of some of the more commonly used fingerprint sensor technologies.

2) Master data: the master data in the development of the fingerprint-based presence application is in the form of institution profiles, data of children with disabilities, units or working hours or hours of study for children with disabilities.

3) Data menu: The data menu is a presence application that is connected to a fingerprint device which includes attendance input. In the presence input menu, if a disabled child makes a presence, a photo and identity will be seen. Next there is a menu for sick leave or leave. This menu displays children with disabilities who do not attend because they are sick or on leave.

4) Report menu: The report menu contains reporting activities from the fingerprint-based presence application both daily, weekly, or monthly reporting. Data from the results of this report attendance report can be printed in the form of XLS.

B. Product Implications

The product produced in this research development is a fingerprint-based presence application for children with disabilities. This fingerprint-based attendance application can be accessed by children with disabilities that are adapted to the weaknesses of the child (by disability category) so as to facilitate children with disabilities in filling attendance and institutional management teams in recapitulating attendance systems especially for children with disabilities.

The results of the development of this product have several implications, namely the development of science and technology, the management of institutions or organizations and also to children with disabilities. First, the implication for the development of science and technology is that the development of fingerprint-based presence applications for children with disabilities is a new innovation for the development of technology that is currently widely used by the public at large.

Second, the implication for the management of an institution or organization is that by developing a fingerprint-based presence application for children with disabilities it can facilitate the management of an institution or organization in managing the reporting of attendance and data recording systems for persons with disabilities. In addition, by developing this application, the risk of fraud is also increasingly reduced. However, if you look at who this application is intended for, namely for children with disabilities, it is less likely to commit fraud or manipulate presence because of the limitations they have. Fingerprint-based presence applications have a high level of accuracy so that if there is fraud it is also easy to detect and the efficiency and effectiveness of the institution can be increased. The use of fingerprint will certainly be more beneficial for users compared to the use of manual-based presence. When viewed from several aspects, here is a comparison between the use of fingerprint and manual presence.

TABLE I COMPARISON OF FINGERPRINT APPLICATIONS AND MANUAL PRESENCE

Comparison aspects	Fingerprint	Manual
Display	70%	20%
Function	80%	40%
Effectiveness	90%	10%
Efficiency	70%	10%

Based on the comparison table, you will get a diagram display like the following picture.
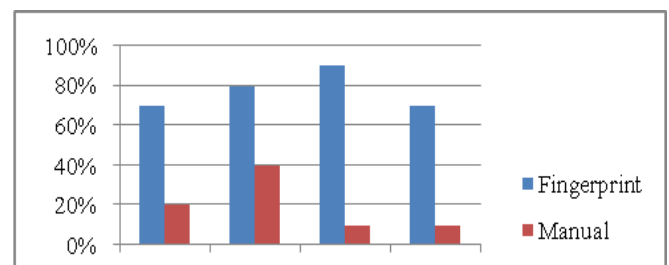

Fig. 1. Fingerprint and Manual Comparison Chart

C. Field Trial Data

The field trial activity in "Fingerprint-based Application Development for Children with Disabilities" was carried out through questionnaires in the form of questions concerning several categories of respondents in the field. Respondents from children with disabilities who are willing to pass the fingerprint application trial are 10 people.

Furthermore, for the aspects of assessment in the activities of "Fingerprint Application Development for Children with Disabilities" will use three main categories, namely the appearance/design category, functionality category and effectiveness category. In each of these categories will be assessed based on four assessment criteria namely usability, easiness, completeness, and attractiveness.

1) Fingerprint Application Design/Display Categories
The assessment results obtained from each indicator are as follows.
Form and use of navigation
a) *Usability: from 10 respondents, 2 people choose very well, 7 people choose good, and 1 person choose enough.*
b) *Easiness: from 10 respondents, 2 people choose very well, 6 people choose good, and 2 people choose enough.*
c) *Completeness: from 10 respondents, 3 people choose very well, 6 people choose good, and 1 person choose enough.*
d) *Attractiveness: from 10 respondents, 3 people choose very well, 6 people choose good, and 1 person choose enough.*

Color selection and layout
a) *Usability: from 10 respondents, 5 people choose very well, 4 people choose good, and 1 person choose enough.*
b) *Easiness: from 10 respondents, 2 people choose very well, and 8 people choose good.*
c) *Completeness: from 10 respondents, 5 people chose very well, and 5 people chose good.*
d) *Attractiveness: out of 10 respondents, 5 people chose very well, 4 people chose good, and 1 person chose enough.*

The language used
a) *Usability: from 10 respondents, 8 people choose very well, 1 person choose good, and 1 person choose enough.*
b) *Easiness: from 10 respondents, 1 person choose very well, 7 people choose good, and 2 people choose enough.*
c) *Completeness: from 10 respondents, 2 people chose very well, 4 people choose good, and 4 people choose enough.*
d) *Attractiveness: from 10 respondents, 1 person choose very well, 7 people choose good, and 2 people choose enough.*

2) Fingerprint Application Function Category
The assessment results obtained from each indicator are as follows.
Application settings according to user requirements
a) *Usability: from 10 respondents, 1 people choose very well and 9 people choose good*
b) *Easiness: from 10 respondents, 4 people choose very well and 6 people choose good*

c) *Completeness: from 10 respondents, 5 people choose very well and 5 people choose good*
d) *Attractiveness: from 10 respondents, 4 people choose very well, 4 people choose good, and 2 person choose enough.*

Search and presentation of data
a) *Usability: from 10 respondents, 5 people choose very well and 5 people choose good*
b) *Easiness: from 10 respondents, 2 people choose very well and 8 people choose good*
c) *Completeness: from 10 respondents, 3 people choose very well and 7 people choose good*
d) *Attractiveness: from 10 respondents, 4 people choose very well and 6 people choose good*

3) Fingerprint Application Effectiveness Category
The assessment results obtained from each indicator are as follows.
Data display speed
a) *Usability: from 10 respondents, 4 people choose very well and 6 people choose good*
b) *Easiness: from 10 respondents, 3 people choose very well and 7 people choose good*
c) *Completeness: from 10 respondents, 5 people choose very well and 5 people choose good*
d) *Attractiveness: from 10 respondents, 1 people choose very well and 9 people choose good*

Effectiveness of Applications for Children with Disabilities
a) *Usability: from 10 respondents, 7 people choose very well and 3 people choose good*
b) *Easiness: from 10 respondents, 1 people choose very well and 9 people choose good*
c) *Completeness: from 10 respondents, 5 people choose very well and 5 people choose good*
d) *Attractiveness: from 10 respondents, 5 people choose very well and 5 people choose good*

Reporting Speed
a) *Usability: from 10 respondents, 2 people choose very well and 8 people choose good*
b) *Easiness: from 10 respondents, 2 people choose very well and 8 people choose good*
c) *Completeness: from 10 respondents, 4 people choose very well and 6 people choose good*
d) *Attractiveness: from 10 respondents, 6 people choose very well and 4 people choose good*

Based on the results of field trials on fingerprint applications for children with disabilities, it was concluded that the application was considered feasible on four criteria. These criteria include usability, convenience, completeness, and attractiveness. The results of this study support the results of previous research on the development of fingerprint applications. Research by Fakih, Raharjana & Zaman [7] about utilizing fingerprint authentication technology for

automation of presence of lectures. Furthermore, research by Krisdiawan & Irawan [8] about the application of presence of lectures with web-based fingerprint and sms gateway. In addition, in line with the study of Lestari, Sumarto & Isdaryanto [9] fulfillment of rights for persons with disabilities in semarang regency through the implementation of the convention on the rights of persons with disabilities in the field of education. In line with research by Rahman, et al [10] on applying fingerprint authentication to employee automation systems.

IV. CONCLUSION

The development of fingerprint-based attendance applications for children with disabilities will make it easier to make attendance reports for children with disabilities and also increase awareness of discipline. After this application has been developed, it is expected that children with disabilities and shading institutions will be able to make good use of this application in order to achieve efficiency and effectiveness in the performance of these institutions.

Furthermore, with the application of fingerprint-based presence for children with disabilities, researchers hope that all activities of children with disabilities are able to be recorded properly and a high level of accuracy. And finally, the development of fingerprint-based presence applications for children with disabilities can improve the discipline of children with disabilities despite their own shortcomings. But this shortcoming certainly cannot be used as an excuse for undisciplined.

REFERENCES

[1] B. O. Rothstein and J. A. N. Teorell, "What is quality of government? A theory of impartial government institutions," *Governance*, vol. 21, no. 2, pp. 165–190, 2008.

[2] M. Adámek, P. Neumann, D. Lapková, M. Pospisilik, and M. Matysek, "Biometric Identification Of Persons.," in *ECMS*, 2017, pp. 460–466.

[3] G. Gat, "Integrasi Fingerprint System dengan Real TIME Absensi Dosen Berbasis Web (Studi Kasus: STMIK Pontianak)," *Cogito Smart J.*, vol. 2, no. 2, pp. 135–146.

[4] E. Muslimin, "Implementation of Strategic Management Based on Finger Print Technology for Improving the Teachers Work Ethics," *Int. J. Nusant. Islam*, vol. 4, no. 2, pp. 97–106, 2016.

[5] S. Rahim *et al.*, "Automated attendance management and alert system," *J. Fundam. Appl. Sci.*, vol. 9, no. 6S, pp. 59–80, 2017.

[6] J. W. Creswell and J. D. Creswell, *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications, 2017.

[7] A. Fakih, I. K. Raharjana, and B. Zaman, "Pemanfaatan Teknologi Fingerprint Authentication untuk Otomatisasi Presensi Perkuliahan," *J. Inf. Syst. Eng. Bus. Intell.*, vol. 1, no. 2, pp. 41–48, 2015.

[8] R. A. Krisdiawan and D. Irawan, "Aplikasi Presensi Perkuliahan dengan Fingerprint Berbasis Web dan SMS Gateway (Studi Kasus Universitas Kuningan)," *Buffer Inform.*, vol. 4, no. 2, 2018.

[9] E. Y. Lestari, S. Sumarto, and N. Isdaryanto, "Pemenuhan Hak Bagi Penyandang Disabilitas Di Kabupaten Semarang Melalui Implementasi Convention On The Rights Of Persons With Disabillities (Cprd) Dalam Bidang Pendidikan," *Integralistik*, vol. 28, no. 1, pp. 1–9, 2017.

[10] M. M. Rahman, T. I. Mishu, M. S. Islam, and M. S. Akanda, "Implement Fingerprint Authentication for Employee Automation System," *Lancet*, vol. 391, no. 10136, pp. 2236–2271, 2018.