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To cite this article: Ahmad Sanmorino et al 2019 J. Phys.: Conf. Ser. 1153 012030

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E-announcement as an early warning notification using smartphone devices in a college

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Abstract. Through this article, we would like to propose the method of urgent information notification or an early warning about the dangers that occur in the college environment by utilizing smartphone devices. Early warning notification media currently still has many shortcomings, a little passive, not directly to the parties who need the information. The media we mean is like a notice board or website portal owned by a college. In other words, the given early warning information may be targeted or otherwise. Therefore, here we try to provide a solution to this problem, which is by utilizing smartphone device to convey information of early warning that is happening or will occur in a campus environment. This information notification system or the early warning system is called e-Announcement.

1. Introduction
Currently, notification of urgent information such as hazard warnings in a college is still using traditional media such as bulletin boards or through website portals. If we want more advanced again, the college can take advantage of information technology in the form of social media in conveying academic information. However, both traditional media and the use of social media-based technology still have limitations, i.e. less effective in find target of information delivery. If an urgent information announcement such as a hazard warning in a college is posted on a bulletin board, then anyone can see it, either in need or not. If the academic notices are posted on the website or social media page, anyone can visit it, can see but not necessarily need that urgent information. With our e-Announcement, it is hoped that urgent information such as hazard warning in a college can achieve the target accurately and quickly. Perhaps the question arises how the urgent information from a college can be targeted and done in a short time? The answer, e-Announcement that we propose requires the student to register first. After registering, user data will be stored in the database. So when the mobile platform passes the urgent information notification from the back-end app, the first thing to do is check the student ID that has been registered in the database.

Related research that utilizes a smartphone device to solve various problems in life has been done by some researchers [1] - [6]. One example is the use of smartphones to provide notification of departure and arrival of the bus to a station [7]. Another example is the notification of the closest route or route to a safe place from the disaster centre [8]. So it is expected to minimize the number of victims and damage that occurred. There are also researchers who focus on notification system performance in providing services to users [9]. The notification system can also be used to notify whether there is a Wi-Fi network or internet hotspot somewhere [10]. And still many other studies, related to the use of...
notation system. E-Announcement that we submit can be integrated into the campus information system as a backbone of all systems in college. This can be done because basically the e-Announcement that we propose also functions like information system [11] that is delivering important information such as warning of danger to those who need it. In providing important information, also must be considered aspects of security source, content, and target information. So the system has been developed not abused by the irresponsible parties. So the security aspect of the e-Announcement system should also be given high priority, as we have done in previous research [12].

2. Experimental Methods
Research Methods are logical and systematic steps used to achieve research objectives. In other words, the research method keeps the direction of the research not out of the original purpose. Selection of research methods tailored to the needs and available resources. Include the needs of the system, user needs, and the environment. While resources include the time of research, the available costs, the person involved and the place to be the object of research. Based on the need and availability of these resources we try to formulate research steps that will be used. Figure 1 shows the steps we will use:

![Figure 1. Research Steps: Input, Process, and Output](image)

2.1. Related Articles and Literature Studies
The first thing we do is study the research and articles related to the research that will be done. Related articles are taken from the online directory of trusted journal systems.

2.2. Understanding System Concepts
After doing further literature study we get an understanding of the system to be developed. Understand the needs and specifications of the system.

2.3. Analysis and Design
Needs and system specifications obtained from the analysis of problems encountered and tried to formulate the problem. Then try to provide solutions to the problems that have been formulated. At
this stage we design an architecture that will be used for the notification system. The following (Figure 2) is an architecture diagram of e-Announcement notification system proposed:

![Architecture Diagram](image)

**Figure 2. Architecture Diagram**

The college’s back-end app works to organize and manage notification messages that will be sent via mobile platform service. One example of a well-known and widely used mobile platform service today is Firebase Cloud Messaging [13]. The back-end app is usually managed by an administrator with the help of several operators. By using mobile platform service, the e-Announcement application can send
an early warning notification message to thousands of student smartphone devices. This will certainly cut the cost of sending notification messages. Unlike the one-on-one system, requires energy, cost and much of time.

The cycle of e-Announcement applications (Figure 3) ranging from registration to get notification services are as follows:

1. **Registration and Confirmation Process**
   First, the students register using token or ID to a mobile service platform. Mobile Platform service will confirm that smartphone device students have successfully registered. Student data will be stored in the database on Mobile Platform Service. At the same time, the smartphone device will send a message to the back-end app that it has already registered.

2. **Important Information Notification Delivery and Broadcast Academic Notifications**
   When there is a warning notification that will be presented to the student. The campus's back-end app will send it to the cloud: mobile service owned mobile platform service.

3. **Broadcast Academic Notifications**
   Mobile platform service will forward it to the student smartphone according to the ID contained in the database.

The next stage is to create a database based on a predetermined solution.

2.4. **Database Development and System Development**
   Database creation is done based on analysis and design. System development is the interface of a database that has been made before. Database development and system development cannot be run at all but in the form of cycles that can be resumed beforehand if needed.

2.5. **System Specifications and Requirements**
   After doing the database, automatically the specifications and system requirements will appear on the surface. Because the database involves the object, that will use the system. By knowing the object that will use the system, the needs of the object can be known.

2.6. **System Testing and Prototype of Notification System**
   Through the testing phase, we will know the lack of a prototype system that has been made. Testing involves users, and other related research, to determine system performance when compared to pre-existing systems.

3. **Results and Discussion**
   The following is the interface of the notification system that we submit:

![Figure 4 The Interface of e-Announcement App.](image-url)
smooth delivery of information. The availability and speed of the internet access, that used by students have been registered.

Table 1 Performance Comparison of e-Announcement Application with Traditional Media in Subjecting Academic Information

| No | Parameter                                      | e-Announcement | Traditional Media |
|----|-----------------------------------------------|----------------|------------------|
| 1  | Ease of obtaining Information                 | √              | √                |
| 2  | Number of Massive Clients (Students)          |                | √                |
| 3  | Depending on Internet Access                  | √              |                  |
| 4  | High Time Complexity                          |                | √                |
| 5  | Very Dynamic Notification Message             |                | √                |
| 6  | Rigid and Static Notification Messages        |                | √                |
| 7  | The Role of Operators is Very Dominant        |                | √                |
| 8  | Can cover Large Area                          |                | √                |

Based on the comparison that has been done (Table 1) can be seen the proposed e-Announcement application has advantages of several aspects, namely the area of information broader delivery, the number of more clients, and notification messages tend to be dynamic. Unlike traditional media (bulletin boards) are very limited in terms of area and number of clients, sometimes even not right on target. Furthermore, the proposed e-Announcement application can be integrated into the college information system, so that synchronization process can be done better. Or it could also be used as a media or learning tool that can be used by students and lecturers, such as research we have done before. The process of monitoring and controlling the use of e-Announcement should always be done so that the success of the implementation of notification system can always be known. This is required for future e-Announcement application development. Research on the prediction of the success of the implementation of a system we have also done in previous studies [14].

4. Conclusion
The proposed e-Announcement application can meet the needs of the campus to convey important information such as hazard warning to students quickly and massively in the college environment. This can be done with the use of a good architecture of the developed system. We realize that this e-Announcement application still has many shortcomings, therefore more in-depth discussion and research can be done in the future.

5. Acknowledgment
This work is supported by the Ministry of Research, Technology and Higher Education of the Republic of Indonesia.

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