E-Character Mental Revolution (E-CMR) based on technology of Mobile Digital Education (MDE) for physics concept

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Abstract. Ubiquitously, flexibility, accessibility, and a variety of cellular technology capabilities make it valuable and a necessity today. However, in general, it is underutilized in learning physics. The purpose of this study is in development of technology E-Character Mental Revolution (E-CMR) Based on Mobile Digital Education (MDE). The research method used was ADDIE (Analysis, Design, Develop, Implement, and Evaluate) with the research implementation ADDIE being 60 students and the ages 22-24 years. The results showed the development of technology of E-Character Mental Revolution (E-CMR) based on Mobile Digital Education (MDE) on the concept of physics.

1. Introduction
Ubiquitously, flexibility, accessibility, and a variety of cellular technology capabilities make it valuable and a necessity today. The phenomenon of destruction causes a state of change in industry movements, or competition for jobs no longer depends on available jobs [1]. Some issues for higher education institutions that need to be addressed appropriately are the enhancement of knowledge-based public life as a result of the ASEAN Common Effective Preferential Tariff for ASEAN Free Trade Areas (CEPT-AFTA). Thus, the escalation of the development of science occurs very quickly as a manifestation of the need for education in developing the character of the Indonesian state [2,3].

This requirement is consistent with the goal of achieving character education [4] by governments that promote the National Spiritual Revolutionary Movement (NSRM). In principle, NSRM has five core personality, values: nationalism, honesty, independence, mutual cooperation and religion. The core values of the character are kindness, good thinking, fulfilling action, good action, and ICT literacy skills known as 21st century skills [5]. Student Character System a mobile learning experience that is rapidly developing character education [6,7]. 1) Teaching personality is very important for learning because the effectiveness of higher education is measured by the degree to which students acquire the required
skills [8]. (2) In the world of work, higher education is expected to bring learning skills to the curriculum [9]. Electronic characters based on mobile digital education (MDE) have the following contributions: (1) Develop problem solving skills [10]. (2) Through MDE, students’ thinking skills, acquire the skills to select relevant information [2]. Mobile learning has a positive effect on education [11,12]. The reasons for the importance of MDE are: (1) Mobile learning has a positive impact on learning, motivation [12,13]. (2) Mobile learning combines formal and informal thinking skills [14]. However, it is considered important for the development of a mental revolution based on MDE based E-CMR. In this study, an MDE-based E-CMR system will be developed using web operations using PHP and MySQL. The study purpose is the development of technology E-Character Mental Revolution (E-CMR) Based on Mobile Digital Education (MDE).

2. Methods
Research method is a research and development (R&D) method that focuses on product development. This research design refers to several stages in the development of a research model. This ADDIE model is the abbreviation for the five stages of the development process, namely analysis, design, development, implementation and evaluation. The ADDIE model is based on every step performed in the order specified, but emphasizing reflection and repetition. This model offers you an approach that focuses on providing feedback for continuous improvement. The results of applying e-learning information technologies using the ADDIE model can, among other things, enrich the pedagogy of the teacher in teaching activities and overcome the limitations of interaction in teaching and learning activities. With the distribution of educational materials, this can be done more efficiently, and the teaching and learning process is not limited to the problem of time and space, while there is a good Internet connection, you can interact using chat tools, audio conference tools can be used to interact with education [15]. The research method used was ADDIE (Analysis, Design, Develop, Implement, and Evaluate) with the research implementation subjects being 60 student and the ages 22-24 years.

Figure 1. Addie design modification of E-CMR based MDE.
Process development of E-CMR software development with linear, sequential model classic life cycle) or waterfall model approach. This approach generally includes activities. System or information engineering (system engineering and modeling): involve gathering requirements (requirements gathering) at the system level with a small amount of analysis and top design. Analysis: software requirements, the requirements gathering process is intensified and focused, especially on software. To understand the nature of the program being built, the analyst must understand the domain of information, behavior, performance and interfaces required. System and software requirements are documented and reviewed by the user. Design: focus on 4 things, namely database design, software architecture, interfaces, and procedural algorithms. The design process translates requirements into software representations before coding starts.

3. Results and discussion

3.1. E-CMR development

The resulting evaluation model design is then applied to a piece of software, so that model can be used directly in schools using E-CMR software. E-CMR is a software with an integrated management system with student data, staff, curriculum (school year, classroom management, subject), statistics and reporting. Below is a full description of E-CMR is accessible on the page http://demo.sirisca.com/.

![Figure 2. E-Character Mental Revolution (E-CMR) based on Mobile Digital Education (MDE).](image)

Based Figure 2, the information about E-Character Mental Revolution (E-CMR) based on Mobile Digital Education (MDE) software offers several functions to facilitate the user. The total number of functions available in E-CMR characters software consists of 17 main functions. Each available function has a unique function. The uniqueness of this function are divided according to the user level of the E-CMR drawing software, only the admin user level has the seventeen kinds of functions. The management functions provided are performed by the admin user level. The admin user level can add or subtract functions provided for other user levels.

The resulting assessment model design is then applied in a piece of software so that this model can be directly used in schools using E-CMR software. E-CMR is software that has the ability as a management system, integrated with student data, staff, curriculum (school year, class management, subject), statistics and reporting. The following is a complete explanation of E-CMR. Specifications for E-CMR of in Table 1 the technical specifications of the character software. Specifications are technical criteria for character software.
Table 1. Software specifications.

| No | Criteria                        | Specification |
|----|---------------------------------|---------------|
| 1  | Type of web-based software      | Web           |
| 2  | Programming Language            | PHP, JavaScript|
| 3  | Database                        | MYSQL         |

Based on Table 1, the information Character software is a web-based software that is, software that requires a web server to run and can be accessed by users using computers, tablets, and smart phones. At the time of software development using XAMPP as a web server, E-CMR are written using the PHP programming language utilizing the Yii Framework and the JavaScript programming language using the jQuery framework. At the time of software development using the Yii Framework version 1.1.10. The data storage software used was MYSQL version 5.1.33.

Main Functions of E-CMR, it software provides various functions to facilitate the user. The total number of functions available in E-CMR software consists of 17 main functions. Each function available has a unique function. The uniqueness of this function are divided according to the E-CMR software user level, only the admin user level has the seventeen kinds of functions. Management functions that have been provided are run by the admin user level. The admin user level is able to add or subtract functions provided for other user levels. Refer to the main functions available in the E-CMR software Table 2 explains in full the available functions as well as a description of the functions contained in the E-CMR software.

Table 2. Functions in the system.

| No | Function                           | Description                                                                 |
|----|------------------------------------|-----------------------------------------------------------------------------|
| 1  | Login                              | Function to verify the user in operating the system                          |
| 2  | Input values and indicators        | Function to enter values and indicators into the system                     |
| 3  | Inputs observable attitudes        | Function to incorporate students’ observed attitudes into the system        |
| 4  | Searching for values and indicators| Function for finding values and indicators by entering keywords             |
| 5  | Read values and indicators         | Function to see values and indicators                                       |
| 6  | Read the attitude development      | Function to see statistics on the development of student attitudes          |
| 7  | Change the password                | The function to change the password                                         |
| 8  | Manage Users                       | Functions to add, change, and improve users                                |
| 9  | Manage teachers and employees      | Function to add, change, and improve teacher and employee data              |
| 10 | Manage students                    | Function to add, change, and improve student data                           |
| 11 | Managing menus                     | The functions for adding, changing, and improving menus                    |
| 12 | Manage classes                     | The functions for adding, changing, and improving classes                  |
| 13 | Managing the School Year           | Function to add, change, and improve the school year                       |
| 14 | Managing the Curriculum            | Function to add, change, and improve curriculum                             |
| 15 | Manage majors                      | Functions to add, change, and improve majors                                |
| 16 | System log                         | Function to view the system log                                            |
| 17 | Logout                             | Function to exit the system                                                 |

Based on Table 2, the information the division of functions above is adjusted to the level of the software user. The E-CMR based MDE software user level consists of admin, teaching team, teacher, supervisor, parent. Adding a user level and adding or reducing functions at each user level can be done by the admin user level by utilizing the user management function.
4. Conclusion

The increase of the development of science occurs very quickly as a manifestation of the need for education in developing the character. So important for the development of a mental revolution based on E-CMR based MDE. The result of the study is N-gain scores were analyzed using quantitative results show that E-CMR based MDE can improve the competency skills students.

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