A Prototype of a Constructivist Application for Online Evaluation in Learning Music

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Abstract—**The problem that often occurs in learning music is its assessment and evaluation. This becomes a subjective task for advisors and students in receiving the evaluation results transparently so that it needs a more efficient, transparent, and easy-to-manage mechanism. By utilizing the knowledge management approach, users can catch and evaluate problems through a system for organizing and presenting problems. This present research aims at designing a prototype of a constructivist application for online evaluation in learning music. These features later need to be tested whether they are relevant to exist business processes or not. The results of the research recommend that the system be implemented to facilitate the music learning process and its evaluation based on KMS and based on requirements analysis of constructivism itself.**

Keywords—online evaluation, learning music, prototype, constructivist application

I. INTRODUCTION

Music is an artwork that comprises instrumental sounds or vocal or both, that produces a beautiful and harmonious masterpiece. A definition of music will always be changeable following the era's development. In this modern era, music is assumed as a compulsory art and continuously growing. Furthermore, music learning is considered to be interesting by society as it can be applied directly in playing popular songs as well as in increasing instinct, motoric, harmonization [1]. Music learning can be at formal institutions such as music schools or non-formal institutions like music courses. Also, public schools provide music extracurricular learning to teach students about the arts of music and the technique of playing music. Purwita and Sumbawati [2] prove in their research that mobile-based learning media can increase students' learning results. Continuing to the era of development, gadget becomes one of the alternatives that can be applied in the learning method or evaluation. An android-based media can combine various media either for learning objectives or for other purposes.

Under the above explanation, the researchers evaluate learning and music can be developed from the mobile technology aspect which is used to build interaction between students and teachers in their learning music process and evaluation. Students do not only get the skills of how to play music but also to increase their social skills, socializing in the building of soft-skill. Mentioned also in the research of Zils and Pachet that learning music nowadays has been moving of functions from the skill focus to the transformation and the influence to the development of students' emotional, attitude, and personality [3]. After graduation, they have skills to develop their own continuously and can be handled problems independently. Additionally, the research by Hutasoit and Dermawan [4] affirms that music can build diplomacy, one of which is through the Samosir music international festival. Therefore, the evaluation and music learning has been much changing from the summative evaluation to the formative evaluation, from only the partial evaluation to the comprehensive evaluation, and from the focus on the result to the focus on the process [5]. Hence, the student's role, in this case, becomes the main focus. With this condition, constructivism is embedded in the many music courses that have performance and applied based, where students can apply new knowledge and can receive feedback quickly, either from listening to their creation or from verbal and non-verbal communication derived from mentor or teacher [6]. Brown in his research [7] proves that constructivism has been a learning paradigm for the last decade, and m-learning has been developed rapidly in the learning paradigm of social constructivist learning.

To formulate and to accomplish those problems, the stages must be carried out to obtain the research that gives good impact and result. To discover and to realize problems toward the designed constructivist application, the researchers carry out the interview, field observation to the users' partnerships and discover the problems (user history) [8] that occurred in the field and also excavate general problems for confirming the information of the determining the requirement system of what will be built and designed [9]. As problems of the students' interest in learning music, the students' unconfident in singing and playing, and other several obstacles are the weaknesses of a realization education learning media system which are mostly still based on the conventional way, where there no tools to measure the skill in learning music and evaluate students'

learning result, this case leads to the conventional way massively used in learning music. This is also supported by Purwita and Sumbawati [2] in their research that mobile learning-based learning media can increase students' learning results and urgently needs evaluation application development that can stimulate the interest in learning music. Accordingly, viewed from the systemic aspects, such as how to visualize, store, and distribute learning contents as well as its evaluation process, as the problems happened in the pandemic covid-19 period which forces the education sector to use the virtual version in the learning process [10]. Such literature reviews in this present research are used as references and supports of research problems, namely: Jones [11] presents academic motivation model which will be further used by the instructor, consisting of five components, where those components must be considered by the instructors when they design the instruction: (1) Empowerment, (2) Usefulness, (3) Success, (4) Interest, and (5) Caring. Additionally, to bring musical appeal according to Issaka and Hopkins [12] must bring about three components models, namely; students' efforts, instructor's level [13], as well as its learning media, added by good suggestion from Paule-Ruiz et al. [14] that new approach marked by mobile device usage must be presented since it has a great possibility to carry out the learning process anywhere and anytime.

Developing a system can be carried out by employing several approaches, that is, conventional approaches or object-oriented approaches. One of the methods categorized into the conventional approach is prototyping. The system developed through this model [15] promotes several advantages such as coordination that can be more intensive with the users and a relative-rapid engineering process. The research carried by Wayan et al. [16] shows that this prototyping involves the users intensively which is proven by the interview and detailed observation. Another reason is that the application they build is considered in a not-too-large application scale so that it is suited to its prototyping characteristics. Davis and Venkatesh [17] suggest that the user candidates must have a direct experience with the prototype system before they can evaluate accurately as they can reflect the users' attitude further after implementing it in the field. In the prototype method, the deployment stage is not a final stage of the system development process, it is a cycle (iteration) to the beginning stage, that is *communication* which includes consultation and interview if it needs development or errors in the developed system [18].

II. METHODS

A. Prototyping

The followings were stages of the used prototyping to build and to develop the application.
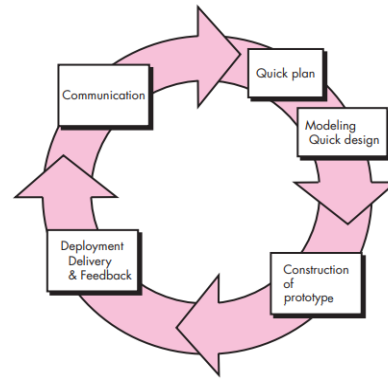

Fig. 1. Prototyping paradigm [19].

1) Communication: In this stage, the researchers identified the users' needs by designing its business process, main menu, and users interface structure.

2) Quick plan: Set a rapid plan and a temporary design which focused on the presentation to the customers.

3) Modeling design: The researchers in this stage modeled the situation of its business process by modeling it with the use case diagram, layout setting as well as input-output.

4) Construction: This stage was a realization of modeling into coding. If finished, the testing had to be carried out directly to minimize errors in coding.

5) Deployment: The application that had been tested and accepted by users was ready to be used, evaluated, and allowed to be given feedback to refine requirements or further needs.

B. Knowledge Management System

Other than just designing a mobile-based application, the researchers also tried to answer problems that occurred in the field such as efforts to increase interest, creativity [20] through the former constructivist theory which is explained by Keast [6], Brown [7] as well as the students' musical talent with features on the application that will become a new solution and alternative to facilitate digitally the process of that interest development and to design easy features' perception to create the users' experience [21]. By formulating the concept and method in conducting this research appropriately, the learning process roadmap and knowledge process achievement were designed which will be then realized into the application system based on the situation in the field [22] that is described in figure 2.
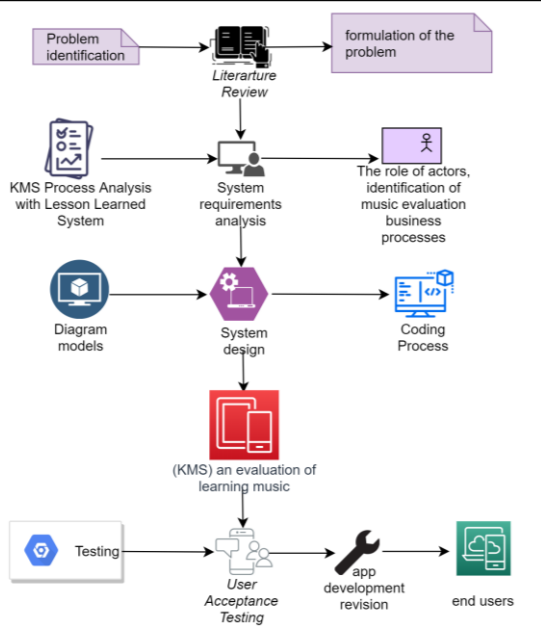
Fig. 2. KM process.

In conducting and formulating the knowledge substance into the application, the researchers employed Knowledge Management System (KMS) as its framework to analyze, to form, to externalize the knowledge, to manage and to distribute process and learning result into a system [23-25].

III. RESULTS AND DISCUSSION

A. KM Process

Table 1 is a realization of the knowledge process of music learning using the KMS approach which is then generated into the application's features.

TABLE I. KM PROCESS

KM Process	KM System Requirements	Modules or Features
Socialization	a feature that allows users (students) to interact with other users to exchange tacit to tacit knowledge	• Forum • Q & A
Externalization	a feature that allows users (students) to pour knowledge, ideas, or other things into user knowledge (explicit)	• Chat • Q & A • Forum • Content Management
Combination	A feature that allows users to collaborate to create new explicit knowledge using existing explicit knowledge	• Content search • Forum discussion • Q & A
Leadership	Features that involve a leader in knowledge development	• Rating/Grading • Knowledge monitoring

KM Process	KM System Requirements	Modules or Features
		• FAQ • Suggestions and Feedback
Technology	apply technology that supports and facilitates the process knowledge	• Responsive • Article Search • Content Search
Culture	a feature that allows users to get rewards from KM that has been created or implemented	• Rewards • Knowledge Ranking Management

The realized features are representations from what researchers obtain from an interview and needs analysis in the field. With features on KM process as a solution and alternative stages to emerge constructivist, that is, a student can manage and implement new knowledge rapidly and can receive feedback very soon, either from listening to their creation or from verbal and non-verbal communication derived from mentor or teacher.

B. Functional List Features

TABLE II. FUNCTIONAL LIST FEATURES

No	Feature	Details	Mandatory
F. 01	Login	Authenticate user data to use the application	Yes
F.02	Change Password	Changes account password for login	Yes
F.03	Logout	Delete a session from the user after using the application	Yes
F.04	Manage Profile	Manages user profile data such as changing personal data	Yes
F.05	Displays course Record Details	Displays the details of music courses data that has been selected by the user from the list of courses	Yes
F.06	Displays On Duty teachers	Displays data of teachers who are currently on duty	Yes
F.07	Displays the tutorials List	Displays available video, modules	Yes
F.08	Displays tips and tricks in Details	Displays details of the selected tips tricks from the list of existing	Yes
F.09	Displays pre-test and grade in Details	Displays details of pre-test and grades from the list of existing	Yes
F.10	Display evaluation indicator	Displays available and additional evaluation indicator	Yes

Functional features are features that must be generated into a system design that the researchers propose. However, the KM features are much more points to facilities to catch, store, and distribute knowledge, that differ from functional features. These features are features designed to accommodate students

and teachers, to bridge their interaction, to evaluate or to receive feedback.
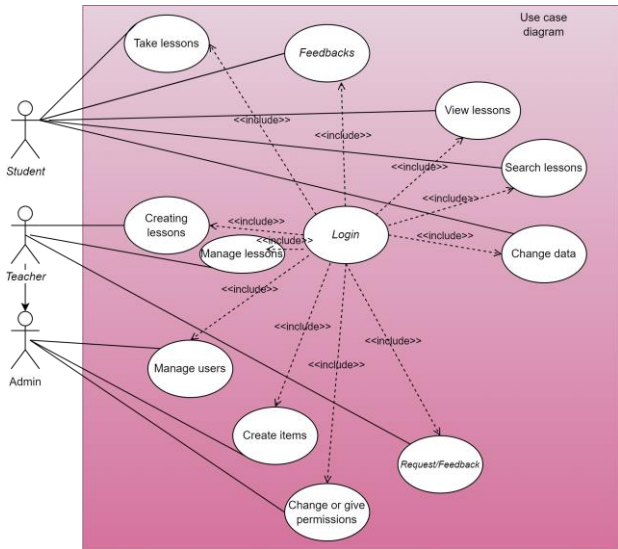
C. Use Case Diagram

Fig. 3.   Use case diagram.

- Student: Students can determine their music lesson; can see their learning process and progress; seek another relevant lesson; change their profile data; accept feedback from their learning result.

- Teacher: Teachers can create their music class; arrange the class page; receive and give feedback from students.

- Admin: can manage users; create new items; change and give permission.

D. Designing User Interface

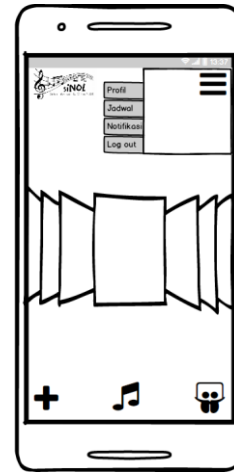Fig. 4.   Login interface.

Fig. 5.   User profile interface.
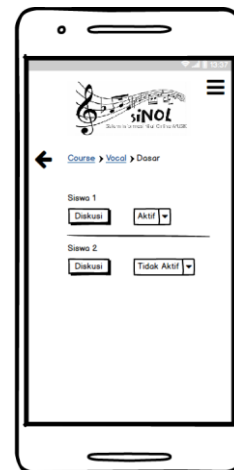

Fig. 6.   Students' grade level.

Fig. 7.   Lesson content list.

Fig. 8. One of KM features.

Fig. 9. Dashboard interface.

IV. CONCLUSION

Prototyping is one of the methods which is often employed to develop software that needs a model or a prototype in presenting a general overview about the application to the user intensively and relatively rapid engineering process. This application is an application where the main users are students and music teachers, hence to give functional and non-functional descriptions, as well as the applications' functions, must be through a prototype for users to have a clear overview. In line with the results of the design, the features are expected to be tested to define the relevance in the business field process. The research result recommends this system to be implemented to facilitate the process of learning music and its evaluation to be based on KMS and requirement analysis from its constructivist.

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