

# **e-Portfolio System Development for Integrating Students' Capability: A Conceptual Framework**

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## **ABSTRACT**

*An electronic portfolio which is known as e-portfolio or digital portfolio is a collection of electronic document describing knowledge, skills, experience, abilities, progress or achievement of a person. The purpose of this paper is to propose a conceptual framework to develop e-portfolio to showcase the students' capability to the industries. This framework will be used at one Higher Education (HE) institution in Malaysia as a guideline for e-portfolio system development. Recently, the initiative of HE Ministry in Malaysia to make students' e-portfolio available at all the public universities have received numerous enquiries for establishing the e-portfolio system in their institutions. A wide literature search was conducted to review on the existing framework for e-portfolio system development. The finding showed that there was a lack of guidance for development of student e-portfolio framework. Therefore, this research discussed a conceptual framework involved in the student e-portfolio system development. The conceptual framework was based on literature review and previously developed frameworks. It is hoped that this framework will be used by other institutions for developing e-portfolio system in the future.*

**Keywords:** *e-portfolio, Conceptual framework*

## **INTRODUCTION**

E-Portfolio is an electronic evidence of achievement and self-evaluation that can be shared on a limited basis to support the formal, informal and non-formal learning process (Balaban, Divjak & Mu, 2011). Electronic evidence may include text, images, video, digital files or even hyperlinks. Most educational institutions require their students to maintain their learning outcomes, experiences and achievements in electronic evidence. These electronic evidences will indicate the capability and featuring work that has been done by the students. Previously, this evidence maintained in a form of paper-based portfolio in which students later use as a foundation to create curriculum vitae for employment upon completion of their study. The limitation using paper-based portfolio are not easily updated or shared online. These days the use of e-portfolio is becoming increasingly common among higher institution students to store, manage and share their electronic evidence (Haggerty & Thompson, 2017).

There are various types of e-portfolio in literature that are based on objective (Klenowski, 2002) and usefulness (Johnson, Mims-Cox & Doyle Nichols, 2009). Generally the e-portfolio can be categorized into three major types: developmental e-portfolio display e-portfolio and assessment e-portfolio (Himpsl & Baumgartner, 2009). The development e-portfolio is used to show the progression and growth of student skills. This portfolio is considered works-in-progress and include both self-assessment and reflection elements. The purpose of this portfolio is to store all the students work which later be selected for display e-portfolio. The display e-portfolio is used to display the students' best work. The purpose of a display e-portfolio is to showcase the achievements obtained by the student. The students will demonstrate this portfolio to potential employers to gain employment at the end of their study. Lastly, the assessment e-portfolio is used to document the student learning based on their learning outcomes. The purpose of an assessment e-portfolio is used to evaluate student capability as defined by the course outcomes.

Although these e-portfolios are different in theory, they actually overlap in practice. Thus, the selection of types of e-portfolio to be developed depends on the requirement of the institution. It is important for the institution to be clear of the purpose for creating the e-portfolio for the students.

However, in Malaysian higher education institutions, students use e-portfolio as a platform to document, share and reflect their learning; and later to showcase their talents, skills and abilities to potential employers. It shows that student portfolios takes many different forms and used for different purposes. So this e-portfolio system need to be carefully designed in a system to meet all the requirement need by the higher education institutions. The development of e-portfolio system requires an appropriate framework to meet the requirement. Therefore, this study was conducted to propose a suitable framework for the development of e-portfolio system for higher institution students.

## **CONCEPTUAL FRAMEWORK**

The conceptual framework help the researchers as a guideline to develop the student e-portfolio system. It helped them to understand better the processes involved in developing the e-portfolio system. Figure 1 shows the conceptual framework used to develop the e-portfolio system. The first phase is initial study. In this stage, the existing student e-portfolio system in the higher education institution were reviewed and analyzed. Based on the review, most of the student e-portfolio system were managed in open source platform. The second phase involves the development of student e-portfolio system using the System Development Life Cycle (SDLC) by Bekri et al., 2013. Below are the five stages involved in the development of student e-portfolio system using the SDLC.

### **Stage 1: Analysis**

The analysis stage is divided into two: requirement gathering and requirement analysis. While the requirements are divided into functional requirements and non-functional requirements. Functional requirements are defined as processes, information, and interactions. These are the desired functionality of e-portfolio system. Non-functional requirements are non-functional characteristics that address operational and technical requirements. They may include the software, security, hosting, environment and etc. Example functional and non-functional requirements for an e-portfolio system are listed in Casley and Day (2014).

There is many existing e-portfolio software available for the development of e-portfolio system. A preliminary research was conducted to evaluate the existing software for e-portfolio implementation in higher education institutions (Himpsl & Baumgartner, 2009). However, the decision to select the right software depends on the requirements, resources, expertise and time needed by the higher education institutions.

Techniques that can be used for gathering the requirements for the development of student e-portfolio are interview, questionnaires, user observation and reviewing of existing documents. Once all the requirements are gathered, it is needed to be analyzed to fit the institutional policies and necessities. The output of this stage will be a set of requirements for the student e-portfolio system.

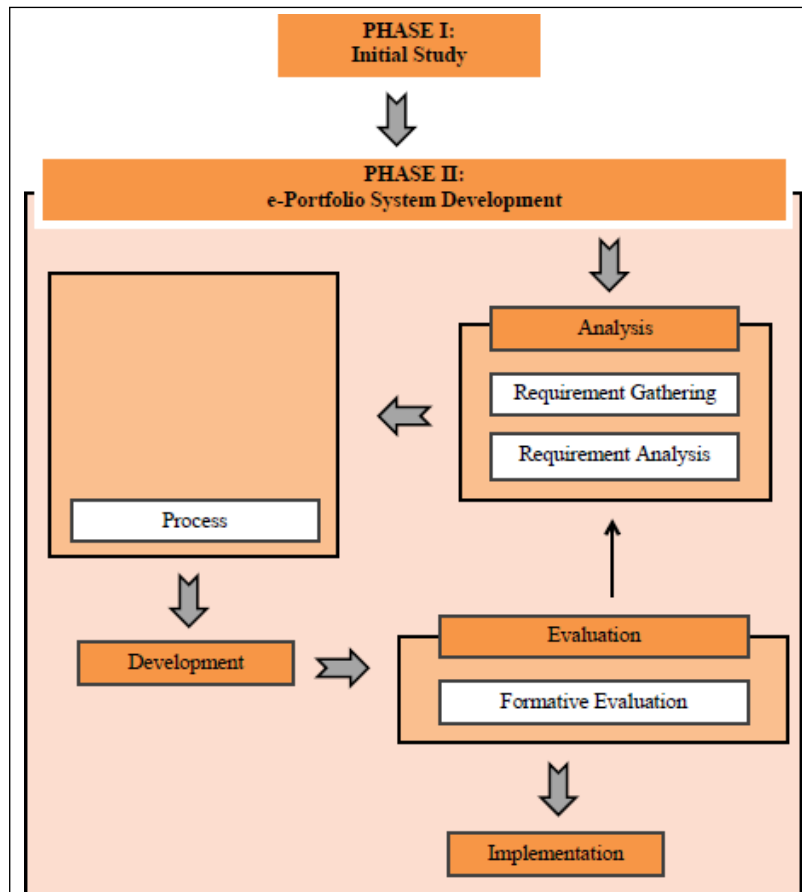


Figure 1: Conceptual Framework for Developing the E-Portfolio System

## Stage 2: Design

In the design stage, the user interface, interaction, database and process were designed. The user interface was design with interface elements required for e-portfolio system. The interface elements included the design of input controls, navigational components and informational components. These elements are the building blocks for e-portfolio system interfaces. Thus it need to be designed to be simple and appropriate so that it helps with task completion, efficiency, and user satisfaction.

The interaction design of e-portfolio system concerns with the way people (e-portfolio system users) interact with the system. There are five ways for a user to interact with the system. The user can interact by using the text, visual representations, physical objects/space, time, and their behaviour. This interaction defines the structure and behaviours of the system. By good interaction design the designer able to convey meaningful information, effectively communicates the system's interactivity and functionality, provide feedback on user interactions and system state changes, and prevent user errors.

Next, the database for student e-portfolio was designed. Tables were created to store all the data and artefacts of student e-portfolio. The database design is divided into three steps: (1) conceptual database design, (2) logical database design and (3) physical database design. The conceptual database model is based on the requirements of the system. While the logical database design is based on the target data model for the database e.g. relational data model. Finally, the physical database design is the implementation of the database on secondary storage.

Lastly, the process design is concerned with how data moves through the system, and with how and where it is validated, secured and/or transformed as it flows into, through and out of the system. There is a process design proposed for the student e-portfolio by (McKenna & Stansfield, 2012). The process begins when students collect digital evidences from their learning experiences to be put into the e-portfolio. They will then select and link those evidences which can be located in online sources like personal blogs, YouTube and etc. Next, they will review, evaluate, and reflect on evidences by making comparisons between what they have done, reflect upon and what they already know. Once completed the reflection process, they will present and share their evidences to their e-portfolio to lecturers and peers. At this stage, the lecturers, supervisors and peers can provide some feedback about the students. Lastly, based on the feedback obtained, the students will plan and understand their mistakes and try to overcome it before going back into the loop again. Besides that, the potential employers or sponsors also can access the students' e-portfolio to view their performance and capability. At the end of this stage, a set of documentation describing the user interface, interaction, database and process design is produced and made available for use in the next phase.

### **Stage 3: Development**

The development of e-portfolio system only begin after the design stage is completed. This stage involves the development of e-portfolio system using the identified software or tool in analysis stage. At this stage all the planning and design of student e-portfolio are turned into a complete working system. The database and application (e-portfolio system) will be stored in development server before it is fully implemented to production (live).

### **Stage 4: Evaluation**

The evaluation is conducted on the e-portfolio system. Before the e-portfolio system goes to live, it should be thoroughly tested. In literature, there are three types of evaluation for evaluating various stages of the design and development process of online learning system. The evaluation types are: (1) diagnostic, (2) formative and summative [9]. But for evaluating the e-portfolio system, the formative evaluation is suggested as it allows us to evaluate the processes and usability of the system (Wright, 2003). Formative evaluation is a type of usability evaluation that helps to “form” the design for the e-portfolio system. A set of criteria proposed by Himpsl, Klaus and Peter Baumgartner (2010) for evaluating the e-portfolio systems is used for the formative evaluation. The outcome from evaluation stage will be used to identify the existing problems in the e-portfolio system. Based on the finding, the system is improved.

### **Stage 5: Implementation**

Once the problems are fixed and system is error free, the e-portfolio system will be implemented. There are few steps need to be followed for the implementation of e-portfolio system. There are:

1. Obtain domain for the e-portfolio system.
2. Move all related folders and database from development into production server.
3. Configure the database and application

4. Test for system functionality to ensure all the function can be accessed once the system is moved to the production server.

Once this process is completed, the e-portfolio system can be accessed online using the assigned domain. The successful of e-portfolio implementation is depending on student's active participation. There are six components for successful implementation of e-portfolio system in higher education institution. These components are awareness, motivation, commitment, resources, leadership, and evaluation (Blevins & Brill, 2017). These component are suggested to be used by higher education institution to support the successful implementation of e-portfolio system.

## **CONCLUSION**

In conclusion, besides being a tool in learning, the e-portfolio system has the potential as displaying the students' performances and capabilities to their peers, lecturers, sponsors and even potential employers. Thus, this study suggested a conceptual framework for the development of e-portfolio system to showcase the students' artefacts'. The collection of students' artefacts in the e-portfolio system offers opportunities for students to reflect on their own work over time and their learning. The findings of this study proposes phases and stages related to the e-portfolio development that may implicate the developers and researchers.

The usage of technology for student portfolio showcase can disadvantage some students. We need to guide the students to use the system and support them technically if needed. Poor digital literacy skills can decrease active participation of students in e-portfolio system. Thus, future research should give emphasize students' skills and their perception of the use of this e-portfolio system.



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