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## Personalized Learning Environment (PLE): Developing a Framework using ADDIE Approach

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### ABSTRACT

**Background:** This paper is a review on Personalized Learning Environments (PLE) focusing on framework development. PLE are portable, ubiquitous learning spaces that allow students to learn to learn, connect with multidisciplinary viewpoints, engage in critical and creative practices, and nurture and develop their learning identity. Personalization is seen as the key approach to handle the plethora of information in today's knowledge-based society. It is expected that personalized teaching and learning will address the needs of the learners more efficiently. **Objective:** The objective of this study is to develop learning framework based on the proposed model for students using PLE approach. **Results:** Additionally, the difference between PLE and traditional method is also presented for incorporating PLEs into a classroom. In this paper, a systematic research framework using ADDIE (Analyze, Design, Develop, Implement and Evaluate) approach is proposed for Personalized Learning Environment (PLE). **Conclusion:** Overall, this paper discuss the proposed of PLE framework to replace restrictive learning systems.

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## INTRODUCTION

Personalized learning cannot take place at scale without technology (Wolf, 2010). By integrating the principles of personalized learning with the tools of technology, some educators argue that they can create the kind of customized learning environment that has the potential for breaking schools out of the industrial-age model of education and bring about true 21st century school reform (Demski, 2012). Nowadays students prefer more customizable and interactive systems for their learning. According to McLoughlin and Lee (2010), digital-age students want an active learning experience that is social, participatory and supported by rich media. Despite attempts by institutions of higher education to harness technology to facilitate learning through online courses, college students more frequently drop out of online courses than they do traditional, face-to-face courses (Hart, 2012).

As a result, in opposition to obsolete learning theories and concepts, modern and learner centered concepts and approaches such as Personalized Learning Environments (PLE) and connectivism have emerged (Mehmet & Hakkan, 2013). Suggested ways of overcoming these barriers include: moving away from a cost recovery model through higher enrollments and tuition; sharing of course materials; making use of external funding sources; ensuring faculty buy-in through involvement; providing opportunities for online teacher training; and having a university wide vision and strategy to ensure sustainability (Owusu-Anash, Neill, & Haralson, 2011). The increase of personal computing technologies, primarily, Web 2.0 technologies have made it easier for learners to create their own learning systems (Johnson & Liber, 2008). PLE uses many content sources, applications and tools for qualified learning. In fact, PLE is often used in our online lives unintentionally. People may use PLEs for formal/informal learning, sharing, communicating and collaborating with others. Social networks, bookmarks, start pages, blogs and etc. All can be considered components of PLE. Furthermore, PLE is useful for:

- Socializing with other learners.
- Customizable content.
- Different, easy and interactive way for learning.

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Now that we have a sense of what PLEs are, questions remain about their place and use in a formal higher education setting. Being able to understand the differences between PLEs (Personalized Learning Environment) and the more traditional CMSs (Content Management System) is a key to understanding how to construct, configure and use these two learning environments effectively to enrich students' learning experiences. The emergence of PLEs is a response to this need as well as to changes in knowledge generation and usage on the web. By examining and understanding the nature, context and underlying pedagogical features of PLEs and CMSs, institutions, pedagogues and students could make better decisions about the most effective and appropriate use of these environments to support and facilitate learning. A number of differences between PLEs and CMSs are outlined in the literature (Wilson, Liber, Johnson, Beauvoir, Sharples, & Milligan, 2006; Goodwin-Jones, 2009; Chatti, 2010; Mott, 2010). The following is a brief overview in Table 1:

**Table 1:** Differences between PLEs and CMSs.

Differences between PLEs and CMSs	
PLE	CMS
Learner-centric	Course or teacher-centric
Tools selected based on learner needs	One-size-fits-all tools
Informal, personal lifelong learning support	Formal learning support
Distributed, loosely coupled, open	Centralized, closed, rigid, standard, compliant
Cognitive load = learn, unlearn, relearn	Simple to train and support
Inexpensive (open source tools)	Licensed software, can be costly for institutions
Identity and data security issues	Institutional control and management of data and security
Bottom-up, emergent, symmetrical	Top down, hierarchical, asymmetrical
Knowledge push and pull	Knowledge push

PLEs need on the one hand to focus on technical issues, regarding information exchange between services and user interface problems (Ullrich et al., 2010). The online environment is one application that has been important for the development of connectivism. According to Baxi (2010), the learning process or pedagogy used in PLEs, with its emphasis on network formation, reflection, openness, connectedness and other ideas, reflect the principles of connectivism. As a result of these ideas, PLE is based on a connectivism and design with connectivist principles. PLEs and connectivism share to some common traits. Common principles of connectivist learning and PLEs are:

- Diversity
- Autonomy,
- Interaction/Connectedness
- Openness (Downes, 2009).

## MATERIALS AND METHODS

The methodology contains three main things which involved the method of data collection, sampling and data analysis.

### A. Data Collection:

Three main methods that data and information have been collected which are:

Questionnaire – Questionnaire was administered to all participants. Students were asked to respond to these items on a five-point Likert scale ranging from “strongly disagree,” “disagree,” “not sure”, “agree” and “strongly agree.”

Interview – Interview was conducted with few Science teachers who expert in Science subject and selected students.

Prototype – The prototype developed in this study. It focuses on Topic 2 which is Nutrition. The sub topics that will be covered in this topic are Classes of Food, The Importance of a Balanced Diet, Human Digestive System, Absorption of Digested Food, Reabsorption of Water and Defecation and Healthy Eating Habits.

### B. Sampling:

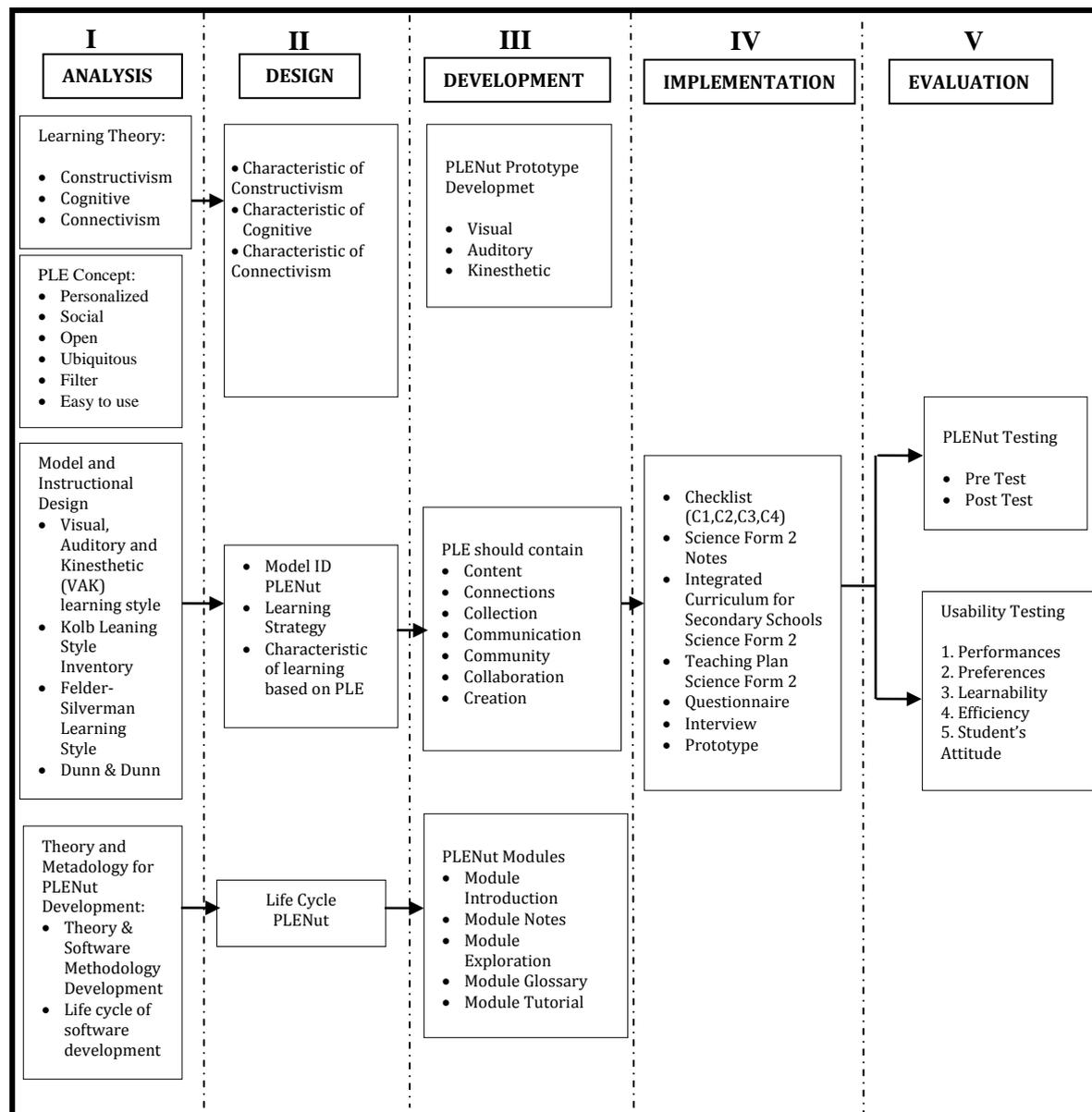
Students from Sekolah Menengah Malim Melaka, Malaysia were chosen as participants by considering that 1) Form 2 students and 2) teachers who taught the Science subject were willing to participate in the experiments. There are 90 students were selected in this study. The purposive sampling technique, also called judgment sampling, is the choice of an informant due to the qualities the informant possesses.

### C. Data Analysis:

The data analysis is used to continue the designing and development of the system. The data from the questionnaire are analyzed by using Statistical Package for the Social Science (SPSS) version 18.0.

### 1. Results:

Figure 1 shows the proposed research framework. The construction of the framework derives from every single component. It is done by mapping all components into a framework.



**Fig. 1:** Development Framework Model for Personalized Learning Environment (PLE).

The methodology used to develop a courseware is ADDIE model. ADDIE model has five phases systematic model used to create sound instructional products for a variety setting. Each phase represents a series of tasks that help to ensure development efforts stay on track, time, and target. Completing each phase satisfactorily increases the chance for the information to be presented timely which remains relevant to the needs of the audience. Each phase of the model has an important element of constructing the instructional design process. In each phase, the instructional designer makes the decisions that are critical for ensuring the effectiveness of the instructional experience.

#### Phase I:

In the analysis phase, the instructional problem is clarified, the instructional goals and objectives are established and the learning environment and learner's existing knowledge and skills are identified. Learning theories that applied in this study are Constructivism, Cognitive and Connectivism. The concept of PLE are personalized, social, open, ubiquitous, filter and easy to use. Model and Instructional Design that suitable for this study are Visual, Auditory and Kinesthetic (VAK) learning style, Kolb Learning Style Inventory, Felder-

Silverman Learning Style and Dunn & Dunn. The theory and methodology for prototype development is based on Software Methodology Development and life cycle of software.

*Phase II:*

The design phase deals with learning objectives, assessment instruments, exercises, content, subject matter analysis, lesson planning and media selection. The design phase should be systematic and specific. The characteristic for each learning theory are defined.

*Phase III:*

The development phase is where instructional designers and developers create and assemble the content assets that were blueprinted in the design phase. In this phase, storyboards are created, content is written and graphics are designed. If e learning is involved, programmers work to develop and/or integrate technologies. The development of PLE prototype based on three types of learning styles which is 1) Visual; 2) Auditory and Kinesthetic. A PLE should contain a) content, b) context, c) connections, d) collection, e) communication, f) community, g) collaboration, and h) creation (WikiEducator, 2010). Peña-López (2010) argued that an effective PLE may contain accessing, aggregating, manipulating, and analyzing knowledge, or in other words, a PLE may provide the facilities of reading, noting, thinking, and writing. Wilson (2008) found that in order to facilitate learning processes, PLE should provide analysis, synthesis, abstraction, and critique components.

*Phase IV:*

During the implementation phase, a procedure for training the facilitators and the learners is developed. The facilitators' training should cover the course curriculum, learning outcomes, method of delivery, and testing procedures. The content of the prototype is Integrated Curriculum for Secondary Schools Science Form 2. During this phase, the testing will be conducted according to Teaching Plan Science Form 2. The methods used are questionnaire, interview and prototype.

*Phase V:*

The evaluation phase consists of two parts: formative and summative. Formative evaluation is present in each stage of the ADDIE process. Summative evaluation consists of tests designed for domain specific criterion-related referenced items and providing opportunities for feedback from the users which were identified. At evaluation phase, there are two types of testing which is 1) Pre Test & 2) Post Test. The usability testing will determine five constructs i) Performances, ii) Preferences, iii) Learnability, iv) Efficiency and 5) Attitude.

2. *Discussion:*

The intent of this working paper is to discuss the proposed framework of PLE in education setting and how they can benefit students in their academic as well as their future professional life. These environments allow students to engage and experiment with various learning contexts as well as to develop their own learner identity. From a pedagogue's perspective, PLEs could provide a context in which to engage students in conversations about how to learn or metacognitive learning. Educators and students can gain, as a result, some valuable insight into informal, tacit learning processes (McLoughlin & Lee, 2010; Martindale & Dowdy, 2010).

3. *Conclusion:*

Due to new possibilities, perspectives, insights and challenges, the concept of PLEs seems to be an interesting but not a very well developed or elaborated concept for introducing an innovative approach within technology-enhanced learning and especially within the field of higher education. The personal learning environment is essentially a computer-based organizing schema for self-directed learning (Van Harmelen, 2008). Learners can create a PLE is their own vision of what an ideal learning system should be. Although an official definition has yet to emerge; there are certain elements which are common to basic PLEs. PLEs have the potential to provide a different and intriguing learning experience for learners, and should be given the opportunity to offer their benefits in all learning environments. As a result, students are not learning beyond the boundaries of course environments, are not engaging in self-directed learning and are not learning how to learn.

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