



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكرو فيلم

بسم الله الرحمن الرحيم



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جامعة عين شمس

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A Generic Adaptive Model for Assistive Educational Games

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ABSTRACT

Many studies have addressed e-learning, aiming to create a platform for the learning process that completes the traditional classroom work and maximizes the effectiveness of learning outcomes. Striving to achieve such platform, studies have considered gamification and personalizing the educational resources for the adaptation of educational systems as per the intended learners through intensive learning analytics. In the events of the recent incident that is the Coronavirus pandemic, e-learning systems have proven to be an essential pillar for education. This raises to surface what many studies have addressed earlier; creating a platform that completes the traditional classroom work and maximizes the effectiveness of learning outcomes. Gamification of the personalized adaptable educational systems have been recently considered to keep the learners motivated and positively progressing in a flow state. However, the current models remain inadequate, providing limited resources for comprehensive learning analytics. Some considered the educational games without fully covering the different learning styles of learners, others did consider learning styles but were domain-specific educational games, while others targeted the adaptation in order to personalize the educational process without mentioning the gamification concept.

In this thesis, the Personalized Adaptive Gamified E-learning (PAGE) model is proposed to provide an infrastructure for a new generation of learning style-based adaptive educational game systems and to extend the Massive Open Online Courses (MOOCs) by providing new satisfactory levels of learning analytics and visualization in the rich e-learning process that supports the learner's intervention in the resultant learning analytics. It is a generalized,

domain-independent model, in such a way that keeps all interested entities engaged through a gamified and personalized learning process. The PAGE model supports the blended learning by encouraging the involvement of the traditional learning process's parties, where effective learning analytics can be sustained to continuously improve the learning experience. The proposed model has been evaluated for its value and usability through a survey from different perspectives as a preliminary evaluation to proceed with the expected vast effort of inter- disciplinary development. In addition, the proposed Learning analytics have been developed to make the necessary adaptation to the course and learner's learning flow, as well as visualizing the process and adaptation decisions to the learners. Results show a positive potential towards learning adaptation and visualization, and a necessity to provide an additional focus for the gamification concept.

PUBLICATIONS

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LIST OF ABBREVIATIONS

Abbreviation	Full word
ACH_c	Achievements location for Course c
ACH_{ic}	Achievements accomplished for learner i in Course c
AST_j	Set of assets associated with OER_j
$DDLearner_i$	Dynamic Data for learner i
FA_{ij}	Failed Attempts for learner i in OER j
FB_c	Overall Feedback for Course c
FB_{ic}	Learner i feedback on Course c
FB_{ij}	Learner i feedback on OER j
FB_j	Overall Feedback for OER j
FS_c	Fictional Story settings for Course c
GA_{ic}	Learner i feedback on Gaming Aspect of Course c
GA_{ij}	Learner i feedback on gaming aspect of OER j
LA_{ic}	Learner i feedback on Learning Aspect of Course c
LA_{ij}	Learner i feedback on learning aspect of OER j
LB_{ij}	Learning Behaviour for learner i in OER j
LO	Learning Object
LO_j	Learning Objective of OER j
LP_j	Learning Preferences for OER j
MOOCs	Massive Open Online Courses
MX_{FA_j}	Maximum Failed Attempts for OER j
MX_{LB_j}	Maximum Learning Behaviour for OER j
MX_{TT_j}	Maximum Time Taken for OER j
MX_{WA_j}	Maximum Wrong Actions for OER j
OER	Open Electronic Resource
$P1_i, P2_i, P3_i, P4_i$	Learning preference's pole for learner i
$P1_j, P2_j, P3_j, P4_j$	Learning preference's pole for OER j
PAGE	Personalized Adaptive Gamified E-learning
PQ_j	Prerequisite OERs for OER j
TP_c	List of Topics for Course c
TT_{ij}	Time Taken for learner i in OER j
UA_{ic}	Learner i feedback on Usability Aspect of Course c
UA_{ij}	Learner i feedback on usability aspect of OER j
WA_{ij}	Wrong Actions for learner i in OER j

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CHAPTER 1

INTRODUCTION

Technology has widely influenced various fields, including education, with the intention of utilizing resources to overcome any shortage in the service quality, learning outcomes, and productivity (Almohammadi, Hagra, Alghazzawi, & Aldabbagh, 2017). Accordingly, the classroom learning experience has been upgraded to be computer/internet-based, commonly known as e-learning. E-learning employs the technological advances to serve the educational process by digitizing the learning material and allowing them to be available with the flexibility of time, budget, and location, with no limitation to the instructor manpower (Tseng, Cheng, & Yeh, 2019).

1.1 Global Interest in E-Learning

One power strength of educational systems over a classroom is related to the wider sector of students that they can serve, having the leisure of time and accessibility, unlike the time constraint, deadlines, and learning duration limitations in the classroom. On the other hand, one-to-one educational method is considered to be the optimal setting for obtaining desired outcomes and behaviors from the students (Sabourin & Lester, 2014). However, the recent regulations following the global pandemic of COVID-19, e-learning proved to be more than auxiliary side-by-side tools with the on-ground process. This sudden heavy dependence on technology with no face to face interaction, increased the urge to boost e-learning systems to better, more dependable version than they currently are.

1.2. Instructional Design Model

Reviewing the standard educational process, three major fundamentals have been emphasized; designing the course structure, teaching, and evaluating the achievement of learning outcomes (Jung, Kim, Yoon, Park, & Oakley, 2019; Petri & Wangenheim, 2017). The instructional design for the educational process can be