A SYSTEMATIC REVIEW OF USER ENGAGEMENT IN E-LEARNING AMONG ADULT LEARNERS

[1]ASNIDABINTI ABU BAKAR, [2]TENGKU SITI MERIAM TENGKU WOOK, [3]NORAIDAH SAHARI ASHARI

[1,2,3]Faculty of Information Science and Technology, UniversitiKebangsaan Malaysia, Bangi, Malaysia
E-mail: [1]asnida78@gmail.com, [2]tsmeriam@ukm.edu.my, [3]nsa@ukm.edu.my

Abstract— E-learning for adult learners is not a new phenomenon. In applying an e-learning for adults, user engagement is one of the most important elements to ensure that user acceptance and understanding becomes an effective learning process. This paper aims to discover existing studies that had been done by previous researcher in the area of user engagement in e-learning with focusing adult learners. 37 papers had been selected and the result discussed about the objectives of the selected papers while the theoretical frameworks, references theories and model applied in the selected papers had been extracted. These findings will help in facilitate other researches for future work in the improving user engagement in e-learning among adult learners.

Keywords— User Engagement; E-Learning; Adult Learners; Adult Learning.

I. INTRODUCTION

Pursuing knowledge should be continuous and updated because after a certain period of time this knowledge we obtain from school and universities will later be obsolete [1]. With the awareness on the importance of long-life learning, many organizations, government agencies, and private companies [2] are beginning to encourage their employees to increase their knowledge by training methods using this online learning[3]. The rapid growth of e-learning technology that can be accessed at anytime and anywhere causes the learning process to be no longer limited to school or university students only. With the dependency towards technology[4] that is becoming more advance like gadgets, smart phone, tablets and androids [5] as a medium for e-learning has made the process of learning more effective, efficient and persuasive for working adult [6], [7], [8]. A good e-learning system not only can deliver the objective of the learning but it also can give a conducive environment to the user to stay with the system in a longer period [9], [10]. However, nowadays many e-learning systems had failed to attract and engage user to use the system. Most of the user will only finished their first course and will not come back to learn other relevant courses. Learning productivity can be affected due to the lack of involvement in the learning process [5].It is now a bigger challenge for the e-learning system provider in making sure that the e-learning system will be fully used by the user or else it would seem as a waste since the cost e-learning system development are consider high [11],[12].

The objectives if this paper is:

- To identify related studies regarding user engagement in e-learning among working adult learners.
- To identify theoretical frameworks, references theories and models that had been applied in the research topic.

This paper is organized in the following section; Section 2 explains the method applied in reviewing process and Section 3 reports the findings. Section 4 discussed the search result and finally Section 5 concludes the study.

II. REVIEW PROCESS

The review processes has been taken as a systematic literature review based on few guidelines [13], [14]. The guidelines have three main phases: planning the review, conducting the review and reporting the review. The stages associated with planning the reviews are; 1) identification of the need for a review, 2) commissioning a review (optional), 3) specifying the research questions, 4) developing a review protocol, and 5) evaluating the review protocol. The stages associated with conducting the review are; 1) identification of research, 2) selection of primary studies, 3) studies quality assessment, 4) data extraction and monitoring, and 5) data synthesis. While the stages associated with reporting the review are; 1) specifying dissemination mechanisms, 2) formatting the main report, and 3) evaluating the report (optional).

2,1 Research Questions

Three research questions had been developed in this study.

1. (RQ1) What research had been conducted on user engagement in e-learning focusing on adult learners? Who, where and when the research had been published?
2. (RQ2) What is the objective(s) of the research that had been listed in the scope of user engagement in e-learning among adult learner?

3. (RQ3) What are the theoretical frameworks or theories that had been applied in the research topic?

2.2 Data Sources

In this study, eight online databases had been accessed as the data source;

1. ACM Digital Library
2. IEEE Explore
3. ISI Web of Science
4. Science Direct
5. Springer Link
6. Taylor & Francis
7. Scopus
8. Willey

Types of data recorded are conference proceedings, journals, books and technical report published between years 2010 until 2015.

2.3 Search Strategies

Search terms used in the main literature search are user engagement, e-learning and adult learning. The search string is then constructed using Boolean "AND" and Boolean "OR" to allow synonyms and word class variant of each keywords. The following search string formed after evaluating the keywords of related literature;

(i) User Engagement in e-learning OR E-learning engagement
(ii) User Engagement of Adult learning OR Adult engagement in learning
(iii) User Engagement in Adult E-Learning
(iv) Factor of User Engagement OR User Engagement Factors
(v) Factor of User Engagement in E-learning
(vi) Adult E-Learning User Engagement Model

2.4 Selection Criteria

Inclusion and exclusion criteria were used to confirm only relevant literature was accepted for the SLR.

1. Inclusion criteria includes the following subtopics:
   (b) Objective of the research.
   (c) Issues and challenges in engaging adult learners in e-learning.
   (d) Models, frameworks or theories applied in engaging adult learners in e-learning.
   (e) Any factors that influence user engagement in e-learning among adult learners.
2. Exclusion Criteria includes the following subtopics:
   (f) Publication with only abstract and not the full paper offered.
   (g) Articles not written in English.
   (h) Articles that not focus on adult learning.
   (i) Articles that focus on only certain subject matter.
   (j) Articles that did not match the inclusion criteria.

III. FINDINGS

3.1 Search Result

Initial research had identified 1729 papers based on search strategies. After evaluating all the papers, 169 were selected due to its relevancy to the research topic through the title and abstract. Then, each of these papers had been filtered based on inclusion and exclusion criteria and finally only 37 papers were met the criteria to comply the research questions.

3.2 Research Question Answers

RQ1 - What research had been conducted on user engagement in e-learning focusing on adult learners? Who, where and when the research had been published?

A complete list of 37 selected papers is presented in Table 5 in Appendix section. 18 papers are a conference proceeding while 17 papers are a journal articles from various journals collection, 1 handbook and 1 review report. Table 1 and Table 2 show an overview of the journals and conference proceedings. In Fig 1 the publication counted per year is presented. 7 papers were published in 2010 and the numbers of publication increased in year 2011 with 9 papers. Year 2012 and 2013 each with 7 and 8 papers were published while the numbers of studies in the research topic drops in the next two years with 2 papers in 2014 and 4 papers in 2015.

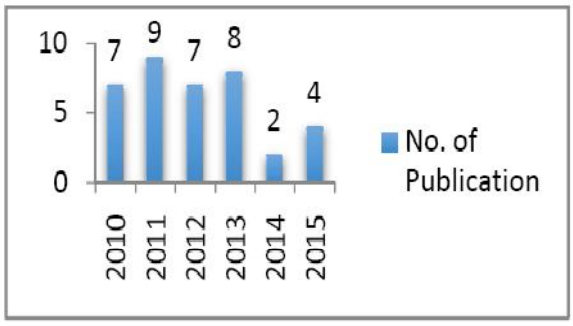


Fig. 1. Number of Publication versus Year

Table 1. Related Research Published in Journals

Journal	Article ID	Year
Computer & Education	J1, J3, J5, J7, J1 J15, J16, J17	2010 , 2011, 2012
Computer in Human Behaviour	J9, J14	2011, 2015
E-Learning and ICT in Education	J12	2012
International Journal of Training and Development	J4	2010
Learning Technology	J2	2011
Knowledge-based System	J8	2011
New Media & Society	J11	2010
Social and Behavioral Science	J6	2010
Workforce Development	J13	2014

Table 2. Related Research Published in Conference Proceeding

Conference	Article ID	Year
ACM SIGITE Conference on Information Technology Education (ACM)	C3	2013
Asia Pacific Conference on Computer Human Interaction (APCCHI)	C15	2013
EAEEIE Annual Conference (EAEEIE)	C2	2011
European Conference on Cognitive Ergonomics (ACM)	C5, C6	2012, 2013
IEEE International Conference on Multimedia and Expo Workshops (ICMEW)	C4	2013
IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE)	C1	2015
International Lifelong Learning Conference (ICLLL)	C7	2011
International Conference on Complex, Intelligent, and Software Intensive Systems (CISIS)	C8	2013
International Conference on Information Technology: New Generations (ITNG)	C9	2013
International Conference on Information Society (i-Society)	C10	2010
International Conference of E-Learning and E-Teaching (ICELET)	C11	2012

RQ2 - What is the objective(s) of the research that had been listed in the scope of user engagement in e-learning among adult learner?

To answer this question, the objective(s) of the selected papers had been divided to three groups; 1) issues and challenges; 2) factors of engagement; 3) framework and model development. 28 papers are focusing on identifying factors that will help to improve user engagement in e-learning from various sources such as human behavior, organizational and technical support. 7 papers were suggesting a model, framework and pattern that can be applied to engaging adult learners, while 5 papers discussed about issues and challenges faced by organization, companies and universities in serving e-learning to adult learners. Table 3 shows the numbers of research grouped by their research objectives.

Table 3. Number of the research by objectives

Journal	No.	Article ID
Identifying issues and challenges in engaging adult learners in e-learning	5	C2, C4, C7, C13, J13
Identifying factors of user engagement/ user participation in e-learning among adult learner	28	B1,C3, C5, C6, C8, C9, C10, C14, C15, C16, C17, C18, J1, J2, J3, J4, J6, J7, J8, J9, J10, J11, J12, J14, J15, J16, J17, R1
Developing a framework/model of user engagement/user participation	7	C1,C3, C11, C12, C15, J5,

(RQ3) What are the theoretical frameworks or theories that had been applied in the research topic?

From the review, 11 theoretical frameworks, reference theories and models had been identified in selected papers. The most popular is Technology Acceptance Model (TAM) had been referred by 7 papers. 4 papers are referring to Theory of Planned Behavior (TPB), follow by Theory Reasoned Action (TRA) with 4 papers while 2 paper are applying Flow Theory as their research fundamental. The rest of the theories and models had only 1 paper referred. Table 4 shows the details of the theoretical framework, reference theories and models that had been found applied in the selected papers.

Table 4. Theoretical Framework, Reference Theories and Model Applied

Journal	No.	Article ID
Technoloy Acceptance Model (TAM)	7	C1, J1, J3, J5, J8, J9, J10
Theory of Planned Behavior (TPB)	4	C9, C11, J4, J5
Theory Reasoned Action (TRA)s	3	C9, C11, J4
Flow Theory	2	C12, J5
Instructional Design Theory	1	J4
Expectation Confirmation Model (ECM)	1	J5
Kearsley and Schneiderman Engagement theory	1	C12
Gerald Grow's Staged Self-Directed Learning (SSDL	1	C3
IS success model (ISSM)	1	R1
Resource-based theory	1	R1
Item Respond Theory (IRT)	1	J2
OCC Model	1	C12
DeLone and McLean ISS Model	1	J6
Aptum Model	1	C12

IV. DISCUSSION

In this section, the findings are discussed based on the current objectives.

Research Objectives

In this review, the research objectives of selected papers had been grouped to three main categories which are; 1) identifying issues and challenges, 2) identifying the factors and 3)developing an e-learning framework and model.

The most highlighted objective in this research area is to identify factors that can help to increase user engagement in e-learning among adult learners. Several studies [15], [16], [17], [18] towards developing e-learning in an organisation, have found that getting adult to engage in e-learning activities has always been a critical issue. In e-learning domain, studies on user engagement factors had been conducted but the results are more focus for school children and university student [19] while adult learners had their own principal in learning [20]. It is important to study these adult learners needs and factors that influence them to engage with the system before investing in the development of the system

and the multimedia content [21]. In this review, the factors were derived from various sources such as interview [C8], [C14], [C15], [C16], [C17], [J11], [J12] literature search [B1], [C3], [C5], [C18] and factor analysis [C2], [J1], [J2], [J3], [J], [J6], [J7], [J8], [J9], [J10], [J14], [J15], [J16], [J17], [R1] from previous researches. The identified factors had been presented in a form of list or framework and model.

The next research objective found in the selected papers is developing a e-learning framework and model that can improve the user engagement in e-learning for adult learners. Most framework and model had been designed, developed and tested based on the factors found in the first objectives. Frameworks and model developed are; Technoself Enhance Learning Framework [C1], Framework for Adult Learner Support [C3], Model of participation in e-learning [J4], Model of E-learning Participation [C11], Kansei Design Model for Engagement in Online Learning [C12], Mental model framework [C15].

Finally, the objective that had been addressed in these selected papers is identifying issues and challenges. The researchers had extracted the issues and challenges faced by the e-learning provider such as companies and organization [J13], [J14], universities [C7] or the government of certain country [C2].

Theoretical Framework, Reference Theories and Models

This review reveals 11 fundamental references that had been use in the selected papers. The most popular is Technology Acceptance Model (TAM). This theory suggests that a person's behavior is determined by the individual's intention to perform the behavior. TAM proposes that two particular beliefs, perceived usefulness and perceived ease of use, are the primary drivers for technology acceptance [C1], [J1], [J3], [J5]. Most researchers relate the user engagement with individual intention. From these basic fundamentals, factors from TAM had been tested together with new factors identified by researches based on their research objectives. Nevertheless, study result from TAM mostly focusing on user acceptance towards the system and factors discussed are more on how technology and external parties such as social and organizational support help to engage user rather than factors from the user [C1], [J1], [J8]. The next theory found is Theory of Planned Behavior (TPB). According to the TPB, attitude impacts users' behavioral intention, which in turn influences their actual behavior. When individuals form positive attitude towards e-learning, they will have a stronger intention toward adopting it, and thus they are more likely to use it [J4], [J5].

Other theories that had been referred in all selected papers become a fundamental for each research done. It depends on the objective of the research. Although all these existing research had their on preferred theory, none of these researches had referred to current engagement theories and model [10], [22], [23] with focusing on user experience that will improve the user engagement.

CONCLUSION

E-learning for working adults now is becoming a trend. Effective usages with full user engagement also play an important role to ensure the success of this e-learning system [9], [10]. Engagement in learning is an essential element in ensuring student acceptance and understanding, for an effective learning environment [15].. The aim of this study is to identify and summarize existing researches on user engagement in e-learning among adult learners for the past 6 years. Final 37 papers had been selected which meet the objectives of this review. The objectives and framework theories and models applied had been discussed. The review provides a brief information about the existing research that can be a reference for other researcher in the same research domain. Future works on user engagement in e-learning among adult learner should focus on identifying factors that influence user engagement based on engagement theory [22] and should be adapt into e-learning domain specifically for adult learners.

Appendix

Table 5. List of Selected Papers

Article ID	Article Details
	Book
B1	Gara, Nicholas. "Lifelong learning as a reference framework for technical and further education." *Second international handbook of lifelong learning*. Springer Netherlands, 2012. 557-579.
	Conference
C1	Jin, Li, Wei Huang, and Zhigang Wen. "Developing a technoself system to improve lifelong learning engagement." *Teaching, Assessment, and Learning for Engineering (TALE 2015 IEEE International Conference on*. IEEE, 2015.
C2	Popescu, Dorin, et al. "Romanian experiences in lifelong learning process and e-learning." *EAEEIE Annual Conference (EAEEIE), 2011 Proceedings of the 22nd*. IEEE, 2011.
C3	Zhang, Chi, and Guangzhi Zheng. "Supporting adult learning: enablers, barriers, and services." *Proceedings of the 14th annual ACM SIGITE conference on Information technology education*. ACM, 2013.
C4	Stojmenova, Emilija, ArturLugmayr, and DejanDinevski. "Persona-based expert review of an e-learning system for adults." *Multimedia and Expo Workshops (ICMEW), 2013 IEEE International Conference on*. IEEE, 2013.
C5	Rogier, Els, Selene Uras, and Gerrit van der Veer "What learners teach us: e-learning patterns for adult ICT education." *Proceedings of the 31st European Conference on Cognitive Ergonomics*. ACM, 2013.

C6 Benvenuti, Laura, ElsRogier, and Gerrit C. van d Veer. "E-learning in a distance learning curriculum: a workplace approach." *Proceedings the 30th European Conference on Cognitive Ergonomics*. ACM, 2012.

C7 Embi, Mohamed Amin. "e-Learning in Malaysiar institutions of higher learning: Status, trends and challenges." *Keynote Address presented at the International Lifelong Learning Conference (ICLLL 2011). Seri Pacific Hotel, Kuala Lumpur*. 2011.

C8 Feidakis, Michalis, et al. "Measuring the Impact c Emotion Awareness on e-learning Situations." *Complex, Intelligent, and Software Intensive Systems (CISIS), 2013 Seventh International Conference on*. IEEE, 2013.

C9 Al-Qahtani, Muhammed, Mansour Al-Qahtani, ar Hatim Al-Misehal. "Learner Satisfaction of E-Learning in Workplace: Case of Oil Company in Middle East." *Information Technology: New Generations (ITNG), 2013 Tenth International Conference on*. IEEE, 2013.

C10 Hashim, Rugayah, Hashim Ahmad, and Nor Aini Ahmad. "Student engagement and course value a quality issues in ICT-based higher education." *Information Society (i-Society), 2010 Internationa Conference on*. IEEE, 2010.

C11 Nejad, NargesZangeneh, and NastaranHajiheydar "An investigation into factors influencing learner participation in e-learning." *6th National and 3rd International Conference of E-Learning and E-Teaching*. IEEE, 2012.

C12 Redzuan, Fauziah, et al. "Kansei Design Model f Engagement in Online Learning: A Proposed Model." *International Conference on Informatics Engineering and Information Science*. Springer Berlin Heidelberg, 2011.

C13 Michalski, Marina P. "Symbolic meanings and e-learning in the workplace: The case of an intranet based training tool." *Management Learning* 2013 1350507612468419.

C14 Chakraborty, M., and F. Nafukho. "Online Class Engagement Per Se: Considering Students'perspectives." *ICERI2013 Proceedings* (2013): 1927-1927.

C15 Abdul Razak, FarizaHanis, et al. "How simple is simple: our experience with older adult users." *Proceedings of the 11th Asia Pacific Conference on Computer Human Interaction*. ACM, 2013.

C16 Jo, Il-Hyun, Dongho Kim, and Meehyun Yoon. "Analyzing the log patterns of adult learners in LMS using learning analytics." *Proceedings of th Fourth International Conference on Learning Analytics And Knowledge*. ACM, 2014.

C17 Wook, TengkuSiti Meriam Tengku, and NoraidahSahariAshaari. "An investigation of user engagement factors in E-learning for working adu learners." *Electrical Engineering and Informatics (ICEEI), 2015 International Conference on*. IEEE 2015.

C18 Arachchi, Samantha Mathara, et al. "Identificatio of learning styles and learning domains in Sri Lanka in the development of e-learning content." *Advances in ICT for Emerging Regions (ICTer), 2010*

Journals

J1 Cheng, Bo, et al. "The effects of organizational learning environment factors on e-learning acceptance." *Computers & Education* 58.3 2012: 885-899.

J2 Cocea, Mihaela, and Stephan Weibelzahl. "Disengagement detection in online learning: validation studies and perspectives." *IEEE transactions on learning technologies* 4.2 2011: 114-124.

J3 Lin, Kan-Min. "e-Learning continuance intention Moderating effects of user e-learning experience. *Computers & Education* 56.2 2011: 515-526.

J4 Garavan, Thomas N., et al. "Understanding participation in e-learning in organizations: a large-scale empirical study of employees." *International Journal of Training and Development* 14.3 2010: 155-168.

J5 Lee, Ming-Chi. "Explaining and predicting users' continuance intention toward e-learning: An extension of the expectation–confirmation model *Computers & Education* 54.2 2010: 506-516.

J6 Ramayah, T., Noor Hazlina Ahmad, and May-Chiun Lo. "The role of quality factors in intention to continue using an e-learning system in Malaysia." *Procedia-Social and Behavioral Sciences* 2.2 2010: 5422-5426.

J7 Van Seters, J. R., et al. "The influence of student characteristics on the use of adaptive e-learning material." *Computers & Education* 58.3 2012: 94 952.

J8 Lee, Yi-Hsuan, Yi-Chuan Hsieh, and Chun-Yuan Ma. "A model of organizational employees'e-learning systems acceptance." *Knowledge-based systems* 24.3 2011: 355-366.

J9 Karaali, Demet, CigdemAltinGumussoy, and FethiCalisir. "Factors affecting the intention to us a web-based learning system among blue-collar workers in the automotive industry." *Computers i Human Behavior* 27.1 2011: 343-354.

J10 Cheng, Bo, et al. "Acceptance of competency-based workplace e-learning systems: Effects of individual and peer learning support." *Computers & Education* 57.1 2011: 1317-1333.

J11 Eynon, Rebecca, and Ellen Helsper. "Adults learning online: digital choice and/or digital exclusion?." *New media & society* 2010: 1461444810374789.

J12 Chatzara, Konstantina, CharalamposKaragiannidi and Demosthenes Stamatis. "Emotional Interactic in e-Learning." *Research on e-Learning and ICT Education*. Springer New York, 2012. 253-265.

J13 Reynolds, Kristal, Karen Becker, and Julie Fleming. "Contemporary Challenges in E-learning." *Workforce Development*. Springer Singapore, 2014. 269-282.

J14 Cruz-Benito, Juan, et al. "Discovering usage behaviors and engagement in an Educational Virtual World." *Computers in Human Behavior* 4 2015: 18-25.

J15 Keramati, Abbas, MasoudAfshari-Mofrad, and A Kamrani. "The role of readiness factors in E-learning outcomes: An empirical study." *Computers & Education* 57.3 2011: 1919-1929.

J16 Bhuasiri, Wannasiri, et al. "Critical success factor for e-learning in developing countries: A comparative analysis between ICT experts and faculty." *Computers & Education* 58.2 2012: 843 855.

J17 Ho, Li-An, and Tsung-Hsien Kuo. "How can one amplify the effect of e-learning? An examination of high-tech employees' computer attitude and flow experience." *Computers in Human Behavior* 26.1 2010: 23-31.

Report Review

R1 Liu, Ying Chieh, Yu-An Huang, and Chad Lin. "Organizational factors' effects on the success of learning systems and organizational benefits: An empirical study in Taiwan." *The International Review of Research in Open and Distributed Learning* 13.4 2012: 130-151.

REFERENCES

[1] Z. B. Kassim, A. Razaq, and B. Ahmad, "E-PEMBELAJARAN: EVOLUSI INTERNET DALAM PEMBELAJARAN SEPANJANG HAYAT," pp. 209–218, 2010.

[2] K. Kaur and Z. W. Abas, "AN ASSESSMENT OF E-LEARNING READINESS AT OPEN," pp. 1–8, 2004.

[3] T. N. Garavan, R. Carbery, G. O'Malley, and D. O'Donnell, "Understanding participation in e-learning in organizations: a large-scale empirical study of employees," Int. J. Train. Dev., vol. 14, no. 3, pp. 155–168, Aug. 2010.

[4] C. Pimmer, N. Pachler, and G. Attwell, "Towards Work-Based Mobile Learning," Int. J. Mob. Blended Learn., vol. 2, no. 4, pp. 1–18, 2010.

[5] V. Tam, A. Yi, E. Y. Lam, C. Chan, and A. H. K. Yuen, "Using Cloud Computing and Mobile Devices to Facilitate Students' Learning through E-Learning Games," 2013 IEEE 13th Int. Conf. Adv. Learn. Technol., pp. 471–472, Jul. 2013.

[6] K. Antonis, T. Daradoumis, S. Papadakis, and C. Simos, "Evaluation of the Effectiveness of a Web-Based Learning Design for Adult Computer Science Courses," IEEE Trans. Educ., vol. 54, no. 3, pp. 374–380, Aug. 2011.

[7] Emilijia, "PERSONA-BASED EXPERT REVIEW OF AN E-LEARNING SYSTEM FOR ADULTS Emilija Stojmenova1 , Artur Lugmayr2 , Dejan Dinevski1," 2013.

[8] Y. Yunus and J. Salim, "Framework for the evaluation of e-learning in Malaysian Public Sector from the pedagogical perspective," 2008 Int. Symp. Inf. Technol., pp. 1–8, Aug. 2008.

[9] S. Attfield, B. Piwowarski, and G. Kazai, "Towards a science of user engagement (Position Paper)," 2011.

[10] J. Lehmann, M. Lalmas, E. Yom-tov, and G. Dupret, "Models of User Engagement," 2012.

[11] R. Maznah, R. Hussain, I. Technology, and K. Lumpur, "eLearning in Higher Education Institutions in Malaysia," pp. 1–6, 2004.

[12] N. Hayaati, M. Alwi, and I. Fan, "E-Learning and Information Security Management," vol. 1, no. 2, pp. 148–156, 2010.

[13] B. Kitchenham and S. Charters, "Guidelines for performing Systematic Literature reviews in Software Engineering Version 2.3," Engineering, vol. 45, no. 4ve, p. 1051, 2007.

[14] N. Azaliah, A. Bakar, H. Selamat, and M. N. Kama, "Service-Oriented Enterprise Architecture (SoEA) Adoption and Maturity Measurement Model :," no. 12, pp. 902–913, 2013.

[15] M. Cocea and S. Weibelzahl, "Disengagement Detection in Online Learning: Validation Studies and Perspectives," IEEE Trans. Learn. Technol., vol. 4, no. 2, pp. 114–124, Apr. 2011.

[16] R. Hashim, H. Ahmad, and N. A. Ahmad, "Student Engagement and Course Value as Quality Issues in ICT-based Higher Education," pp. 69–72, 2010.

[17] B. Cheng, M. Wang, J. Moormann, B. a. Olaniran, and N.-S. Chen, "The effects of organizational learning environment factors on e-learning acceptance," Comput. Educ., vol. 58, no. 3, pp. 885–899, Apr. 2012.

[18] M. Walshaw, "Powerful Theory of Active Engagement," vol. 24, no. 3, pp. 4–10, 2015.

[19] D. Choi and J. Kim, "Why People Continue to Play Online Games : In Search of Online Contents," vol. 7, no. 1, pp. 11–25, 2004.

[20] L. Popa and A. Danila, "Using E-learning In Romanian Knowledge Based Society," pp. 237–242.

[21] A. binti Abu Bakar, T. S. M. T. Wook, and N. S. Ashaari, "An investigation of user engagement factors in E-learning for working adult learners," in 2015 International Conference on Electrical Engineering and Informatics (ICEEI), 2015, pp. 633–637.

[22] B. H. L. O. Brien and E. G. Toms, "What is User Engagement ? A Conceptual Framework for Defining User Engagement with Technology 1," vol. 59, pp. 938–955, 2008.

[23] H. L. O. Brien and E. G. Toms, "The development and evaluation of a survey to measure user engagement," vol. 61, no. 2010, pp. 50–69, 2010.

★★★