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Research paper

Web 2.0-Based Collaborative Learning Framework Promoting Lifelong Learning:Developing Sustainability Competencies

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Abstract

This paper aims to present a Web 2.0-based collaborative Learning framework based on the social constructivist theory promoting lifelong learning. The Web 2.0 provides conditions of collaborative learning, multiple modes and methods of learning and multiple perspective to achieve learning goals. This practical framework under the guidelines of design science research methodology allows learners to actively engage in the learning process, construct own knowledge and use to solve real-world problems collaboratively. Experts reviewed and confirmed the validity of the framework. Three successive iterations, working with 42 students in formal learning and Facebook members in informal learning were conducted to demonstrate and validate how learners started developing critical thinking, self-regulation and use of knowledge. The framework contributes to the practice of lifelong learning with emphasis on developing sustainability competencies that enable learners to gain more skills in applying different problem-solving frameworks to complex daily life problems.

Keywords: *design science research methodology; Lifelong learning, Sustainability Competencies; Web 2.0-based Collaborative Learning.*

1. Introduction

The lifelong learning policy of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) indicated that the education and learning are not limited to, schools or the workplace; they occur throughout life and in a wide array of formal and informal settings. The UNESCO Institute for Lifelong Learning emphasizes on inclusive education and lifelong learning systems which enable learners both within and outside formal systems [1].The goals of lifelong learning are to enable learners not only to understand problems, but also to contribute to solution efforts [2]. Todays sustainability problems such as,Climate change, poverty and pandemics threaten human-existence [3]. This study's framework for Collaborative learning, promoting lifelong learning in social constructivist e-learning platform contributes educational settings that allows learners to actively engage with real-world sustainability problems[4][5]. The practice based on this study's framework enables learners use their knowledge when they exposure to real-world problems[6,7,8,9,10]. Studies show the main role of education in developing sustainability competencies. They emphasise on structured activities that foster the step-by-step development of key competencies in sustainability[11]. Yet, little attention has been paid to how could facilitate the initial development of such competencies in learners across different disciplines. This article presents an experience-based learning framework based on Design Science Research Methodology (DSRM) guidelines [12] to promote lifelong learning and collaborative learning goals in social constructivist theory and demonstrate a structured framework and action plan for competencies in sustainability.

2. Web 2.0-based Lifelong Learning Framework promoting competencies in sustainability

The Web2.0-based Lifelong Learning Framework in this study has 3 parts, theoretical model, activities for the initial development of sustainability competencies and the practical experience-based framework under the guidelines of Design Science Research Methodology (DSRM) (Figure 1)

2.1 Theoretical model

The instruction's model in social constructivist theory is adopted, but modified from [13]that includes three parts: learning methods, conditions and goals. Using Web 2.0 as information, communication technology (ICT) for collaborative learning(CL) could present conditions of learning in Constructivist theory, complex and relevant learning environments, social negotiation, multiple perspectives and multiple modes of learning, ownership in learning, self-awareness and construction of knowledge. These conditions of instruction provide good opportunities to achieve lifelong learning (LLL) goals, critical thinking, self-regulation and use of knowledge. The competencies in sustainability are considered as another goal in instruction model because this study, plans to ap-

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ply activities for the initial development of sustainability competencies in pedagogical strategy. Facebook as a web 2.0 tool and Telegram a cloud-based messenger were considered for collaborative learning that allow people from every corner of the world interact with each other and share own knowledge and key issues related to global realities and sustainable development themes from many disciplines. This is in line with 2030 Agenda for Sustainable Development that is considered for nowadays global village [14].

2.2 Action plan for sustainability competencies

This study considered collaborative learning and social negotiation as methods of instruction to promote lifelong learning. Then, determined critical thinking(understanding multiple perspectives, reasoning), self-regulation (constructing own knowledge, ownership in learning) and use of knowledge (practice in web 2.0 artifacts and use in real life, practical learning) as constructs of LLL[15][16][17]. Furthermore, this study designed practical activities for all goals of instruction, considering defined constructs with high priority on Competencies in sustainability (Figure 1). This framework has been used for training in class and teach students how to practice the collaborative learning and use of knowledge for solving the problems. The pedagogical strategies and instructional design of Facebook in this study emphasis on Inquiry based learning, reasoning and sharing information with reliable references to promote learners' critical thinking. Facebook as an online social networking service, has various characteristics, which fit well with the Social Constructivist teaching[18][19]. In addition, research and team work in this study help independent learning and self-regulation that provide good conditions for lifelong learning. The Facebook and Telegram groups in this study could support communication and collaboration in order to promote lifelong learning [20]

2.3 Experience-based DSRM

The experience-based design science framework is adapted from [21] study that appeared in Management Information Systems Quarterly (MISQ) in March 2004. This framework is used for iterative design-evaluation of Web 2.0-based CL and user testing. Designing the information technology (IT) artifacts requires a scientific foundation that the rigor cycle bridges this scientific foundation with the design cycle. The social constructivist theory in this study supports all design process that was explained in the theoretical model. The design cycle is connected to the environment for finding the problems and getting feedback
for refining the design process. This help learners actively engage with real-world problems and supports the development of sustainability competencies better than theory-based methodology. The framework interweaves activities with theoretical and methodological inputs as well as with reflections and discussions. (Figure 1)

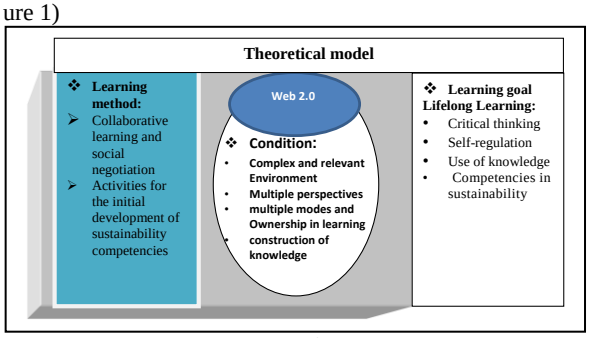

Fig. 1: Web 2.0-based Lifelong Learning Framework

Table 1: Validity evaluation of Framework

Goals	Activities for the initial development of goals
Critical thinking	➢ Inquiry-based learning ➢ Problem-solving ➢ Learning through examples ➢ Learning by reasoning
Self-regulation	➢ To help students learn through their own agency, investigation and construction own knowledge ➢ Self assessment , to continually evaluate and further motivate one's actions
CL, and Use of knowledge promoting life long learning	➢ Learning by doing ➢ To understand and reflect on the norms and values that underlie one's actions ➢ Research and team work ➢ CL with empathy ,practicing self-control and endurance ➢ Social negotiation and presents own ideas and exchange diverse beliefs
Sustainable competencies	➢ Problem-solving, to find the best solution for sustainability problems ➢ Collaboration and team work to apply solutions to sustainability problems ➢ To reflect on own role in Sustainability issues and share experiences and knowledge with groups and communities specially via Web 2.0 based-CL artifact

3. Validity of Framework

The validity evaluation of this study's framework was conducted in the two parts: The evaluation of theoretical framework with expert review and instantiation validity in three cycles of design-evaluation.
This study created a Facebook page and groups for collaborative learning and social negotiation and designed based on this study Framework(figure 1). Then developed artifact was applied in two courses in Kulliyyah of Information and Communication Technology (KICT) and 42 students from two courses conducted a formative assessment of the artifact. The students and experts highly rated developed Web 2.0 based CL and use of the artifact with training, well changed their perception. Instructor-student interaction increased the engagement of students in CL,but there are some problems such as students' personal problems or their culture that affect the CL process.The findings show there are urgent needs for more practice and instructors engagement in Web 2.0-based CL process.

Finally, the effectiveness of artifact in acquisition of sustainability competencies was evaluated. The findings from participant observation show the effective role of the developed artifact in motivating learners to engage with sustainable development goals.In communication step of study, developed artifact was demonstrated to the Iranian Telegram groups. The group research about sustainability was conducted in local contexts.We created the "Environmental Protection Campaign" in telegram groups and taking photos of waste separation and sharing in different groups increased engagement of others in our campaign. With collaboration and social negotiation, we found innovative solutions to Waste separation and collection for recycling (Table 1).

Evaluation phase	Questions	Design Process	Overall Results
Theoritical model	What is the artifact? How is the artifact represented? What is experts' perception about artifact?	Web 2.0 based CL (artifact) Representation to : Experts in IIUM , Face to Face and on FB Iranian Experts, Face to	The artifact successfully was represented and experts confirmed its validity

		Face and on Telegram	
Instantiation	How the utility , quality and effectiveness of artifact are measured in 3 iterative cycles? What design improvements are identified during each design cycle	The integration of teaching strategy and activities according developed framework to artifact The integration of sustainability concepts and issues instructor-student interaction increased the effectiveness of CL ,but there are some problems such as students personal problems , their culture and so on , that show needs for more practice and instructors engagement .	➢ Confirmation the utility , Quality and effectiveness of artifact and emphasis on its CL potential. ➢ The students highly rated the effectiveness of artifact to achieve goals ➢ artifact and use of artifact with training well changed their perception.
Competencies in sustainability	How artifact is effective in acquisition of sustainability competencies	More interaction with Iranian Telegram groups and conducting group research about sustainability in local contexts We created the Environmental Protection Campaign in telrgram group and taking photos of waste separation and sharing in different groups increased engagement of others in our campaign With collaboration and social negotiation we found innovative solusions to Waste separation and collection for recycling	➢ Acquisition of sustainability competencies

4. Conclusions

The research was iterative cycles of design-evaluation that encompassed a preliminary investigation in the theoretical model of instruction and an active approach in using innovative Web 2.0-based collaborative learning for motivating learners to engage with social constructivist and sustainable development goals. The artifact includes methods of collaborative learning and social negotiation and action plan for defining theory into practice.This action plan supports the development of Lifelong Learning goals and sustainable competencies. Facebook as a web 2.0 tool and Telegram a cloud-based messenger were considered as delivery tools in this study. Although this study intentionally designed and developed the artifact for two courses it could be used in other courses, levels and learners as well as could be applied in the application domain. This study has presented valid and accurate theoretical model for lifelong learning and implement them practically with iterative cycles of design-evaluation based on the DSRM. The framework that is presented in this article can be a good example for further studies to transfer experience-based learning activities in different educational contexts as well as in real-world with high priority on sustainability.

References

[1] UNESCO Institute for lifelong learning (UIL),Strengthening the foundations of lifelong learning. Retrieved from http://uil.unesco.org/), 2017

[2] Wiek, A. and Kay, B. “Learning while transforming: solution-oriented learning for urban sustainability in Phoenix, AZ”, Current Opinion in Environmental Sustainability, Vol. 16, pp. 29-36, 2015, available online: https://doi.org/10.1016/j.cosust.(2015).07.001

[3] Kates, R.W., Clark, W.C., Corell, R., Hall, J.M., Jaeger, C.C., Lowe, I., McCarthy, J.J., Schellnhuber, H.J., Bolin, B., Dickson, N.M., Faucheux, S., Gallopin, G.C., Grübler, A., Huntley, B., Jäger, J., Jodha, N.S., Kasperson, R.E., Mabogunje, A., Matson, P., Mooney, H., Moore, B., III, O’Riordan, T. and Svedin, U. “Sustainability science”, Scienc e, Vol. 292 No. 5517, (2001), pp. 641-642

[4] Rowe, D.“Education for a sustainable future”, Science, Vol. 317 No. (2007), 5836, pp. 323-324.

[5] Brundiers, K., Wiek, A. & Redman CL, “Real-world learning opportunities in sustainability: from classroom into the real world”, International Journal of Sustainability in Higher Education, Vol. 11 No. 4, (2010), pp. 308-324

[6] Remington-Doucette, S.M., Hiller Connell, K.Y., Armstrong, C.M. and Musgrove, S.L, “Assessing sustainability education in a transdisciplinary undergraduate course focused on real-world problem solving: a case for disciplinary grounding”, International Journal of Sustainability in Higher Education, Vol. 14 No. 4, (2013), pp. 404-433.

[7] Wiek, A., Whitycombe, L. and Redman, C.L, “Key competencies in sustainability: a reference framework for academic program development”, Sustainability Science, Vol. 6 No. 2, (2011a), pp. 203-218, available online: https://doi.org/10.1007/s11625-011-0132-673.

[8] Wiek, A. and Kay, B, “Learning while transforming: solution-oriented learning for urban sustainability in Phoenix, AZ”, Current Opinion in Environmental Sustainability, Vol. 16, (2015), pp. 29-36, available online: https://doi.org/10.1016/j.cosust.2015.07.001

[9] Wiek, A. and Kay, B. “Learning while transforming: solution-oriented learning for urban sustainability in Phoenix, AZ”, Current Opinion in Environmental Sustainability, Vol. 16, (2015), pp. 29-36, available online: https://doi.org/10.1016/j.cosust.2015.07.001

[10] Ataie.F, (2013). Facebook`s potential for Collaborative Learning: An Emerging Educational trend in promoting lifelong learning in IIUM, International Journal of Information Technology Computer Science (IJITCS), 7(1)

[11] Brundiers, K., Wiek, A. & Redman CL, “Real-world learning opportunities in sustainability: from classroom into the real world”, International Journal of Sustainability in Higher Education, Vol. 11 No. 4, (2010), pp. 308-324

[12] Hevner, A., & Chatterjee, S. "Design science research in information systems" (pp. 9-22). Springer US. (2010)

[13] Driscoll, M.P. "Psychology of Learning for Instruction (pp.384-407); Ch.11-Constructivism. (2005).

[14] UN DESA DSD (United Nations Department of Economic and Social Affairs, Division for Sustainable Development) (2015). Sustainable Development Goals: 17 goals to transform our world. United Nations Sustainable development knowledge platform [online resource]. Retrieved 9 November 2017 from https://sustainabledevelopment.un.org/.
[15] Driscoll, M.P."Psychology of Learning for Instruction" (pp.384-407); Ch.11-Constructivism,(2005)
[16] UNESCO, "Education for sustainable development goals: Learning objectives" Paris: UNESCO. (2017). Retrieved November 2017 from http://unesdoc.unesco.org/images/0024/002474/247444e.pdf
[17] Burak. L. "Independent activities teach skills for lifelong learning". Journal of Health `Education, 24(5): 376-378. 1993.
[18] Julia, J, Potentials of Facebook as a Pedagogical Tool for College Lecturers Julia. Journal Communication Spectrum, Vol.1 No.2, (2012)
[19] Llorens. F; Capdeferro. N (2011). "Facebook's Potential for Collaborative e-Learning" [online article]. Revistade Universidady Sociedad del Conocimiento (RUSC). 8(2), 197-210.
[20] Ractham, p., Kaewkitipong, L. "The Use of Face book in an Introductory MIS Course: Social Constructivist Learning Environment", Decision Sciences Journal of Innovative Education, Vol.10, No.2, (2012)
[21] Hevner, R. F., Daza, R. A. M., Englund, C., Kohtz, J., & Fink, A. Postnatal shifts of interneuron position in the neocortex of normal and reeler mice: evidence for inward radial migration. Neuroscience, 124(3), 605-618. (2004).
[22] Ahmed, S. F. (2007, December). A new approach in Industrial automation application" Embedded system design for Injection Molding Machine". In Multitopic Conference, 2007. INMIC 2007. IEEE International (pp. 1-5). IEEE