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A Personal Learning Environment Framework to Enhance Communication Skills and Psychology

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Abstract: Personal Learning Environments (PLE) are systems that help learners take control of and manage their own learning. This includes providing support for learners to set their own learning goals (with support of their teachers), manage their learning, both content and process communicate with others in the process of learning. The Personal Learning Environment is a system that allows connecting students, teachers, school managers, tutors, community by means of open and commercial ICT solutions inside and outside the school facilities, supporting lifelong learning, enabling students to control and define its own learning processes under the mentoring of the teacher. A personalised learning environment increases the students' motivation and creates a learning situation where they can control their own learning at their own pace. It allows students to actively design their own learning strategies. PLE enables better contact between student/teacher, and the education is less teacher-centred. PLE and modern technology together create a customised learning environment that suits the development of the 21st century classroom. The technology of today makes it possible to create PLE solutions which are developed to suit the demands from both teachers and students. PLE in combination with technical tools increase the students' interest in STEM (Science, Technology, Engineering and Mathematics) subjects, which is important as there is a growing demand in STEM related professions. The young generation of today primarily learn by being interactive. This requires interactive classrooms with personalized ICT solutions.

Keywords: *PLE, STEM, employability skills, perception, undergraduates.*

1. Introduction

When the Covid-19 pandemic reached Malaysia, the government made the study from home appeal to all schools and universities throughout Malaysia. The appeal, which was enforced on 16 March 2020, was expected to flatten the curve of the rapid transmission of Covid-19. Hence, online learning became the only option to carry out the learning process safely from home. Various social media, such as WhatsApp, YouTube, Zoom, Webex, Facebook, Instagram, Line, Telegram, and others, began to be used effectively as learning tools. Digital technology and its derivatives are rapidly developing to bridge the gap between space and time in distance learning activities between learners and teachers.Digital technology in teaching and learning activities at universities has long been widely used in the 21st century. This technology-based education is highly relevant to the characteristics of the younger generation whose learning styles are different from previous generations. The students of this generation are classified as a 'millennial' generation, or 'Gen Y', who were born between 1980 and 2000 [1, 2]. The millennial generation is considered a 'digital native' generation because they have been

familiar with technology since their childhood [3]. This generation is tech-savvy, and they have a high dependency on digital technology [4].The development in student literacy attached with advanced technology has emerged the increase of digital technology in education [5]. The rapid development of digital technology presents its own challenges for teaching staff in the learning process. Students' learning styles also change, resulting in differences in values, perspectives, and approaches between generations. The millennial generation expect to be involved in their learning and being active learners by digital technology [5], so the lectures must have digital learning platform, include the smart phones, laptop, computers and the internet. Besides digital devices, learning process in architecture education not only needs average computer programs, but it is supported by specific software, namely AutoCAD and Sketchup. Interestingly, students have been simultaneously motivated by using digital technology, particularly using modelling and Computer-Aided Design (CAD) technology in the process of design [6]. Changes in the meaning of learning in the mindset of millennial learners in the higher education environment will result in changes in mindset and action patterns in the climate and learning environment to answer the challenges of the times [7]. The challenges faced by higher education today are student learning styles and lack of enthusiasm of lecturers in utilizing technology as a learning tool [8]. In addition to that, there is a wide gap between senior lecturers and millennial students [9]. The incompatibility between lecturer teaching styles and student learning styles may cause decreased student interest in learning, which may lead to a lack of self-confidence [10].Personal Learning Environments (PLEs) describe the tools, the communities and the services which are recommended by individual educational platforms and which are used by students, in order for them to direct their learning and pursue their learning goals [11]. PLEs, unlike Learning Management Systems (LMSs), tend to be student-centred. They facilitate learners to access, collect, manage and share the digital objects of their ongoing learning experiences. Instead of integrating different services into a centralised system, PLEs provide students with a variety of services and with control, in order for students to select and use these services in the way they consider appropriate [12].

The appearance of PLE has significantly facilitated the usage and the common use of open and reusable online learning resources. The PLE is more than ever the paradigm for supporting new learning models for the digital times [11]. Students can access, download, restructure and republish a great variety of learning materials via open-access services, which are provided in the cloud. Open Educational Resources (OERs) can be described as the "teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others, depending on the Creative Commons license in use" [13].Self-regulated learning is a substantial aspect of PLE, as it allows learners to become "meta-cognitively and behaviourally active and motivated participants in their own learning process" [14]. Although psycho-pedagogical theories about self-regulated learning date long before the arrival of the PLE, self-regulated learning is a significant feature of the latter. Self-regulated learning is activated in the PLE and is focused on connecting independent resources in a way that fulfils a particular learning goal. Following this example, self-regulated learning allows learners to regulate their learning; thus, learning outcomes are significantly increased [15].There is an assumption, as noted in the works of Allen and Seaman [16] that it is essential that institutions of higher learning incorporate all the web 2.0 tools in order for students to enhance their ability to collaborate, communicate, and learn. The ability of students to personalize and choose the tools they use to learn is strongly supported by many energetic academics. That powerful support threatens to preclude a serious discussion about some of the underlying assumptions involved with the use of PLEs in teaching, and the possible downside PLEs might have with learning or education itself.

2. LiteratureReview

Developing the Learner's Control Model: As observed earlier, PLEs are increasingly attracting the attention of educational researchers and practitioners as the effective technological tools and a pedagogical approach addressing issues of learner's control. Surprisingly, while supporting learner's control appear to be laudable and defensible objectives of the PLE concept, it seems that these notions and the ways of how to attain them very often remain unanswered, vague and too general in PLE literature [17]. Indeed, affected by the existence of a dominant technology-driven approach to developing PLEs, a common solution proposed to support learner's control is to provide them with a set of Web 2.0 tools and services and to allow them to select and use these tools in a personal way they deem fit. This 'gift-wrapping' approach to new technologies and media can at best

provide some technological personalization and add-ons to existing practices of students [18] rather than supporting their control and improving the quality of learning [19] [20]. On the contrary, as asserted by Rahimi et al., to support and enhance learner's control, new technologies and learning theories must together serve as catalysts for fundamentally rethinking and redefining what the pedagogical and epistemic practices of teachers and students can be and should be in PLEs. According to Fiedler and Väljataga [21], any attempt for corroborating learner's control should facilitate a comprehensive and concurrent shift of control over the full range of crucial instructional components towards an individual learner or a group of them. Based on this view, they conceptualized a PLE as a collection of all the resources that an individual has access to and can turn into instruments to actualize and exert control on the operational level of crucial instructional components, including learning objectives, strategies, resources, evaluation criteria, and process reflection.In this section by taking advantage of the above-mentioned learning theories and concepts the researcher propose a learner's control model addressing the perceived objectives of the PLE concept, see Fig. 1. This model has been developed by adapting the learner's control dimensions model as proposed by Garrison and Baynton [22]. According to Garrison and Baynton [22], learners' control is not achieved simply by supporting the learners' independency. Rather it can be attained by establishing a dynamic balance between independence (i.e. learner's freedom to choose what, how, when, and where to learn), power (i.e. cognitive abilities and competencies) and support (i.e. learning resources, structures and supports the learner needs in order to carry out the learning process and keep control over learning process) through the process of communication between teachers and learners.

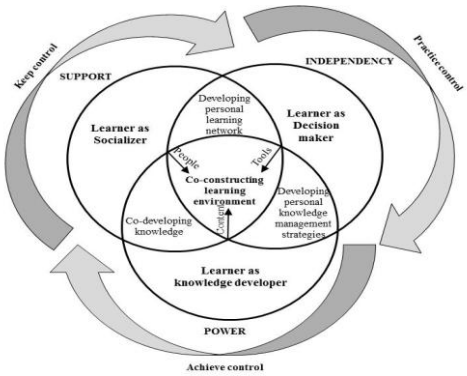

Fig 1. The proposed model to support learner's control in the learning process.

To develop the learner's control model, the researcher has taken two steps. First, taking the importance of social learning in the PLE concept into consideration, the researcher decided to extend the support dimension in the Garrison and Baynton's [22] model to encompass social support provided by the social context of the learning environment. This decision was based on the understanding that the social context of the learning environment can provide learners with the relevant support they need to keep control over their learning and overcome the difficulties faced during the learning process, and can assist them to make appropriate decisions regarding their learning process. Then, considering the significant emphasis of the PLE concept on learner's engagement and activeness, the power, support and independence dimensions were translated into the active roles a learner should undertake in their learning, namely knowledge developer, socializer, and decision maker, respectively. The learner's control model is based on the assumption that learners in order to be in control of their learning process should act as (i) knowledge developer to achieve control on their learning by acquiring relevant cognitive capabilities, (ii) socializer to keep control on their learning by acquiring and utilizing social and help seeking/giving skills, and (iii) decision maker to practice control on their learning by performing personal learning endeavours and managing and tailoring web tools to their personal needs and preferences. The model also explains how to make a balance between these roles by supporting and encouraging activities for co-developing knowledge, developing personal knowledge management strategies, developing personal learning network, and co-constructing the learning environment. These roles and their interplays will be described below:

A. Learner as Knowledge Developer

Learning and knowledge development are two sides of one coin [23]. By defining the learner as knowledge developer, the model aims at providing learners with opportunities to use Web technologies to produce different types of content as a means to develop their cognitive capabilities and address their essential need of 'mindful engagement' [24]. Cognition relates to the conscious mental processes by which knowledge is accumulated and constructed, such as being aware, seeking answers, knowing, thinking, learning and judging, making generalisations, and testing the hypotheses that they have generated [24, 25].Defining learner as knowledge developer aims at preparing learner in response to the rapid and relentless changes in technological, social and knowledge landscapes. As described earlier, these changes have given rise to new challenges to human competence and make it essential to adopt new approaches to knowledge and cognition development manifested in learner-driven knowledge building/ knowledge creation metaphors [26]. Built upon these metaphors, recent learning theories are increasingly emphasizing the importance of introducing technology-based learner-centric instructional strategies into education to develop cognitive capabilities of learners by encouraging and scaffolding them to go beyond individual efforts and collaborate for the advancement of knowledge. The pivotal point of far most learning theories and principles states that learning can occur most effectively when learners are actively engaging and participating in making and constructing artefacts that are meaningful to them and can be shared with others [27]. In the lens of these theories, learning is analogous to an innovative and creative process where something new is created and the initial knowledge is either substantially enriched or significantly transformed during the process. Facilitating this innovative process, among other factors, asks for providing learning resources and support for collaborative knowledge creation [23].Appropriating and remixing content [28] can be used to establish knowledge creation approaches within educational and workplace settings. Empowering and supporting learners to create learning content using Web 2.0 might trigger their individual and social thinking and foster cognitive and metacognitive activities such as analysing, evaluating, synthesizing, and creating digital artefacts. Further, as remarked by Chang, Kennedy et al.[29] supporting and strengthening learner-generated content approach has the potential to empower learners to negotiate 'intellectual authority' with their teachers and improve their control over their learning process. Along similar lines, McLoughlin and Lee[27] asserted that following learner-generated content approach might trigger individual and social thinking of learners and foster higher level of cognitive and metacognitive activities such as analysing, evaluating, synthesizing, and creating digital artefacts. Web 2.0 technologies have provided unprecedented opportunities to support the learner-generated content approach. Combining the participatory, micro-content, and openness aspects of Web 2.0 facilitates a unique sort of participatory appropriation process known as 'collaborative remix-ability' that recombines the information and micro-content generated by students to create new content, concepts, and ideas [30 - 32]. It is noteworthy that the production of content by students should be envisioned as a process rather than an end product aiming at providing opportunities for students to practice higher-order thinking skills using technology. In this regard, Chang et al.[29] argues that 'the key benefit of learner-generated content lies in the process of creating, knowledge construction, and sharing as opposed to the end product itself' (p. 168).

B. Learner as Socializer

By defining the learner as socializer, the model aims to develop social competences and skills among the learners and encourage them to practice and strengthen these capabilities by means of technology. The rationale behind this role says that in order to enhance learners' control they should be provided with appropriate rooms to practice and acquire communication, collaboration, and help seeking/giving skills. Accordingly, by supporting the socializer role the model aims at increasing learner's awareness about the learning potential of the social context in the learning environment and improve his/her ability to exploit this potential to enrich his/her learning experiences. In addition, social supports are needed to succeed knowledge building. On this basis,Bereiter and Scardamalia[26] define knowledge creation as a cultural practice where learners undertake 'collective responsibility for advances in community knowledge' by receiving support to manage different aspects of their learning process including defining problem, setting learning objectives, monitoring advances, and setting work on to a new course.Interaction is a critical component of social learning. Wagner[33] defined interaction as 'reciprocal events that require at least two objects and two actions. Interactions occur when these objects and events mutually influence one another' (p. 8). According to Anderson [34], interaction serves a variety of learning

including enhancing learner's control, facilitating the adaptation of the learning environment and programs based on learner input, allowing participation and communication, creation of the learning communities, and realizing one's perspective on a subject. Anderson[34] describes six types of interaction in online learning including instructor-learner, instructor-content, instructor-instructor, and learner-learner, learner-content and content-content interactions. Furthermore, Hillman et al.[35] presented the concept of learner-interface interaction as a process of manipulating technology by learner to accomplish learning tasks. More recently, Dron[36] considered 'group' as a first class object in social software and Web 2.0 technologies that has an existence in its own rights. Accordingly, he defined four further interactions in Web 2.0-based learning environments, including: learner-group, instructor-group, content-group, and group-group.

While the above interactions are related to the learning environments within formal education, Attwell[37, 38] enumerated a series of interaction within workplace learning environments including: (i) the interaction between 'more knowledgeable other' or MKO and learners.

The more knowledgeable other refers to 'anyone who has a better understanding or a higher ability level than the learner particularly in regards to a specific task, concept or process. Traditionally the MKO is thought of as a teacher, and older adult or a peer' [38], (ii) the interaction between learners themselves, (iii) the interaction between learners and the wider community including formal educational institutions, communities of practices, or local or extended personal learning networks, and (iv) the interaction between learners and technology which mediates other interactions and also learning.By defining the learner as a decision maker, the model aims at preparing learners to become autonomous learners by providing them with appropriate choices and confronting them with situations that require them to make decisions about their learning independently. It can be argued that providing learners with appropriate choices and allowing them to practice decision making regarding their learning process can improve their metacognition knowledge and abilities to make informed and wise decisions which are key elements of self-regulated learning process. In this regard, as contended by Boekaerts [39], one of the key issues in self-regulated learning is an individual's ability to select, combine and coordinate different strategies in an effective way. Dron[40] has connected the concept of control to the choices, either made by teacher or manager or learner. On this basis, he commented that one measure of a 'mature learner' is to become more capable of making relevant and effective choices with respect to their learning experiences. Accordingly, he concluded that providing learners with decision-making opportunities regarding the educational process is a prerequisite for them to move from a 'state of dependence' to 'one of independence.'

To support the role of the learners as the decision maker there are several opportunities within educational settings, including:

- Providing learners with appropriate choices in terms of pedagogical choices (i.e. subject, learning strategies, learning goals, evaluation methods), social choices (i.e. people with whom to engage in learning, peers to share knowledge, functional role in group, communities to join), and technological choices (i.e. web-based resources, tools, content, content format, time and place for learning) to be used to support and pursue their personal learning pathways [40].

- Providing learners with a personal space to be used as an activity space to work with web tools and pursue their personal learning experiences; and involving them in choosing, evaluating, and exploiting relevant web artefacts [20, 41].

In formal education, the growing heterogeneity of available web-based tools and resources is influencing the educational process by changing the dilemma of teachers and students from a perceived lack of choice and accessibility to choose wisely from increased options [42]. As a result, making decisions regarding to selecting, evaluating, accessing, and exploiting the most appropriate technology to drive teaching and learning process is becoming more and more complicated, prevalent, and indispensable processes in today's learning [43, 44]. Further, the features and functionalities of Web 2.0 tools are considered to be in 'a state of perpetual beta' [45]. On this basis, people argue that the permanent and extensive contact of students with web 2.0 tools and technologies besides 'unceasing development' of these tools can posit students as pioneer explorers of new learning functionalities and potential of Web 2.0 tools and, consequently, can provide great opportunities for students to negotiate the structure and design of courses with their teacher through finding, assessing, and

introducing relevant web tools and artefacts to be used for designing appropriate web-supported learning activities [20].

C. The Interplay Between the Learner's Roles

As shown in Fig. 1, the defined roles are interconnected and have interplays as below:

- Co-developing knowledge: refers to the interplay between the knowledge developer and socializer roles, and represents the socio-cognitive activities resulted from individual and collective actions of students such as: questioning about the content, giving and receiving feedback, commenting, content recommending, rating, knowledge presenting, knowledge sharing, and collaborative remixing and authoring of content.

- Developing personal knowledge management strategies: relates to the interplay between the knowledge developer and decision maker roles and represents the personal strategies and mechanisms for managing knowledge such as filtering, personal bookmarking, developing a personal strategy to evaluate web content, and developing a personal dashboard of web tools and services to support content producing activities.

- Developing Personal Learning Network (PLN): refers to the interplay between the socializer and decision maker roles and represents the individual-driven learning activities initiated by learners to enrich and extend their learning experiences through collecting experts and forming connection with them.

- Co-constructing the learning environment: refers to the interplay between the knowledge developer, socializer, and decision maker roles. As described earlier, involving learners in constructing the learning environment is one of the objectives of the PLE concept. From the lens of the learner's control model, the learning environment is a dynamic outcome of the learners' shared practices and endeavours around producing or sharing content, using and learning with provided learning choices, and learning with peers and connecting experts and more knowledgeable. This approach to learner-driven constructing of the learning environment conceptualizes the development of the learning environment as a shared responsibility of learners is in line with knowledge building and creating approaches defining leaning 'as a process of knowledge creation which concentrates on mediated processes where common objects of activity are developed collaboratively' [46].

3. Conclusion

Generally, smart learning environment is effective, efficient and engaging [47]. The learner is always considered as the heart of smart learning environment. And the goal of smart learning environment is to provide self-learning, self-motivated and personalized services which learners can attend courses at their own pace and are able to access the personalized learning content according to their personal difference [48]. Koper [49] proposed that smart learning environments are defined as physical environments that are enriched with digital, context-aware and adaptive devices, to promote better and faster learning. Hwang [50] specified that the potential criteria of a smart learning environment include context-aware, able to offer instant and adaptive support to learners, and able to adapt the learner interface and subject contents. Smart learning environment not only enables learners to access ubiquitous resources and interact with learning systems anytime and anywhere, but also provides the necessary learning guidance, suggestions or supportive tools to them in the right form, at the right time and in the right place.

Learning can take place anytime and anywhere via the utilization of smart devices. The context-aware aspect plays an important role in smart learning environments that can support to provide proper learning service to learners. Kim et al. [51] designed a smart learning environment based on cloud computing. The smart learning service provides context-awareness supporting push smart learning content to learners through collecting and analysing their behaviours. It aims to provide personalized and customized learning services to learners. Scott and Benlamri [52] built a smart learning environment, which is learner-centric and service-based, based on semantic web and ubiquitous computing. The learning environment is composed by ubiquitous collaborative learning spaces, which transform traditional learning spaces into intelligent ambient learning environments through context awareness and real-time learning services. Huang et al. [53] considered a smart learning environment is high-level digital environment that realizes learning context awareness, recognizes learner's characteristic, provides adaptive learning resources and convenient interactive tools, records learning process automatically and evaluates learning outcomes. Its goal is to support easy, engaged and effective learning for learners.Based on

interactive resources and services, smart learning environment is learner-initiated and collaborative [54]. Spector [55] considered that smart learning environment supports planning and innovative alternatives for learners and instructors, and should be effectiveness, efficiency, engagement, flexibility, adaptivity, and reflectiveness. And these features might include support for collaboration, struggling learners and motivation.Through reviewing these literatures, it is concluded that smart learning environment emphasizes learner-centric, personalized and adaptive learning service, interactive and collaborative tools, context-aware and ubiquitous access. And smart learning environment aims to support to realize the effective, efficient and meaningful learning for learners.

As stated, smart education is a new paradigm in global education. The objective of smart education is to improve learner's quality of life-long learning. It focuses on contextual, personalized and seamless learning to promote learners' intelligence emerging and facilitate their problem-solving ability in smart environments. With the development of technologies and within a modern society, smart education will confront many challenges, such as pedagogical theory, educational technology leadership, teachers' learning leadership, educational structures and educational ideology.In the expectation on smart education, the smart learning environments could decrease learners' cognitive load, and thus enable learners to focus on sense making and facilitate ontology construction. Also students' learning experience could be deepened and extended, and thus help students' development in an all-round way (affectively, intellectually, and physically). Students can learn flexibly and working collaboratively in smart learning environments, and thus could foster the development of personal and collective intelligence of learners. Furthermore, better customize learning support could be provided for students to improve learners' expectation.As the concept of smart city has been paid more attention [56], the requirements of smart education based on smart city are promoted. The overall goal of smart education under smart city architecture is to provide every citizen personalized services and seamless learning experience. Learning happens in anywhere and anytime and produce lots of behavioural data of learners. How to integrate the data of different scenarios in smart cities and build data-centric smart education is a big challenge to educators in order to provide seamless learning experience and customized personalized service for learners. The interconnected and interoperable learning service and experience between smart education system and other systems of smart city are the future research focus.

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4. References

[1] H. Raslie, S. Pit, and S. Ting, "Millennials' expectations of life at the university and the workplace: A malaysia perspective," International Journal of Education, vol. 8, no. 3, pp. 71-84, 2016.

[2] T.J. Smith and T. Nichols, "Understanding the millennial generation," Journal of Business Diversity, vol. 15, pp. 39-47, 2015.

[3] McAlister, "Teaching the millennial generation," American Music Teacher, vol. 59, pp. 13-15, 2009.

[4] N. Dolby, "The future of empathy: Teaching the Millennial Generation," Journal of College & Character, vol. 15, no. 1, pp. 39-44, 2014.

[5] H. Hashim, "Application of technology in the digital era education," International Journal of Research in Counseling and Education, vol. 2, no. 1, pp. 1-5, 2018.

[6] J. Glymph, "Evolution of the digital design process," in B. Kolarevic, Ed. Architecture in the Digital Age: Design and Manufacturing, pp. 149-176. London: Taylor & Francis, 2003.

[7] Hardika, E. N., Aisyah, K. M., Raharjo, and D. U. Soraya, "Transformation the meaning of learning for millennial generation on digital era," International Journal of Interactive Mobile Technologies, vol. 14, no. 12, pp. 69-81, 2020.

[8] P. A. Tess, "The role of social media in higher education classes (real and virtual) – A literature review," Computers in Human Behavior troll Conference 2016 (IBCC 2016), 2013, vol. 66, pp. 1-5.

[9] T. Lindquist, "Recruiting the millennium generation: The new CPA," CPA Journal, vol. 78, 56-59, 2008.

[10] H. M. Noor, "Teaching and learning styles," PowerPoint presentation in Kursus Asas Pengajaran dan Pembelajaran (KAP), Institute of Leadership and Development (ILD), UiTM, 23 November 2016

[11] L. Castañeda,N. Dabbagh, andR. Torres-Kompen, (2017). Personal Learning Environments: Research-Based Practices, Frameworks and Challenges. Journal of New Approaches in Educational Research, 6(1). doi:10.7821/ naer.2017.1.22

[12] L. Castañeda, M. Cosgrave, V. Marín andC. Cronin, (2016). Personal Learning Environments: PLE Conference 2015 (special issue guest editorial). Digital Education Review, 29. Retrieved from http://greav.ub.edu/der

[13] DE Atkins, JS Brown JS and AL Hammond. A review of the open educational resources (OER) movement: achievements, challenges, and new opportunities. Menlo Park: The William and Flora Hewlett Foundation. 2007. http://www.hewlett.org/uploads/files/Hewlett_OER_report. pdf

[14] B. J. Zimmerman, (2015). A social cognitive view of self-regulated academic learning. Journal of Educational Psychology, 81(3), 329–339. doi:10.1037/0022-0663.81.3.329

[15] S. Armakolas, C. Panagiotakopoulos &C. Massara, (2015)., The self-regulated learning and the learning environment in Distance Education. In Proceedings of the 8th International Conference in Open and Distance Learning (pp. 102-112).

[16] E. Allen and J. Seaman, (2013) Changing Course: Ten Years of Tracking Online Education in the United States.

[17] I. Buchem, (2012). Psychological Ownership and Personal Learning Environments: Do sense of ownership and control really matter? Proceedings of the third International PLE Conference.

[18] G. Fischer and E. Scharff, (1998). Learning Technologies in Support of Self-Directed Learning. Journal of Interactive Media in Education, 1998(2), p.Art. 4. DOI: http://doi.org/10.5334/1998-4

[19] T. Väljataga and M. Laanpere, (2010). Learner control and personal learning environment: a challenge for instructional design. Interactive Learning Environments, 18(3), 277-291.

[20] E, Rahimi, J. Van den Berg and W. Veen, (2014b). A Pedagogy-driven Framework for Integrating Web 2.0 tools into Educational Practices and Building Personal Learning Environments. Journal of Literacy and Technology, 15 (2), 2014.

[21] S. Fiedler and T. Valjataga, (2011). Personal learning environments: concept or technology, International Journal of virtual and personal learning environments, 2(4). Retrieved from http://citeseerx .ist.psu.edu/ viewdoc/download? doi=10.1.1.185.

[22] Garrison and Baynton (1987). Concepts: Beyond independence in distance education: The concept of contro. January 1987 American Journal of Distance Education 1(3):3-15 DOI:10.1080/08923648709526593

[23] MA. Chatti, M. Jarke M and D. Frosch-Wilke D, (2007) The future of e-learning: a shift to knowledge networking and social software. Int J Knowl Learn. 3(4/5):404–20.

[24] N. Watts, (1997). A learner-based design model for interactive multimedia language learning packages. System, 25(1), 1-8.

[25] M. Barak, (2010). Motivating self-regulated learning in technology education. International Journal of Technology and Design Education, 20(4), 381-401.

[26] C. Bereiter andM. Scardamalia, (2014). Knowledge building and knowledge creation: One concept, two hills to climb. In S. C. Tan, H. J. So, J. Yeo (Eds.) Knowledge creation in education (pp. 35-52). Singapore: Springer.

[27] C. McLoughlin and M. J. Lee, (2008). Future Learning Landscapes: Transforming Pedagogy through Social Software. Innovate: Journal of Online Education, 4(5), n5.

[28] H. Jenkins, (2009). Confronting the challenges of participatory culture: Media education for the 21st century: MIT Press.

[29] R. Chang, G. Kennedy and T. Petrovic, (2008). Web 2.0 and user-created content: Students negotiating shifts in academic authority. ASCILITE, 165-169.

[30] C. McLoughlin and M. J. Lee, (2010). Personalised and self-regulated learning in the Web 2.0 era: International exemplars of innovative pedagogy using social software. Australasian Journal of Educational Technology, 26(1), 28-43.

[31] P. Chen andH. L. Chen, (2007). Knowledge building and technological dynamics in an online project-based learning community. International Journal of Technology in Teaching and Learning, 3(2), 1-16.

[32] R. Alexander, (2006) Towards dialogic teaching: Rethinking classroom talk. Dialogos, Cambridge (2006)

[33] E. D. Wagner, (1994). In support of a functional definition of interaction. American Journal of Distance Education, 8(2), 6-29.

[34] M. Anderson and Anderson, (2003). Text Types in English 1-2. Australia: Macmillan Education Australia.

[35] D. C. Hillman, D. J. Willis andC. N. Gunawardena, (1994). Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners. American Journal of Distance Education, 8(2), 30-42.

[36] J. Dron, (2007b). Designing the undesignable: Social software and control. Educational Technology & Society, 10(3), 60-71.

[37] G. Attwell, (2010a). Can Web 2.0 and Social Software Help Transform How We Measure Quality in Teaching, Learning, and Research? Changing Cultures in Higher Education: Springer, 433-446.

[38] G. Attwell, (2010b). Supporting Personal Learning in the Workplace. Proceedings of the first International Conference on Personal learning environments, Barcelona. Retrieved from http://pleconference.citilab.eu/wp-content/uploads/2010/09/ple2010_submission_66.pdf.

[39] M. Boekaerts, (1999). Self-regulated learning: Where we are today. International journal of educational research, 31(6), 445-457.

[40] J. Dron, (2007a). Control and Constraint in E-Learning: Choosing When to Choose: Choosing When to Choose: IGI Global.

[41] E. Rahimi, J. van den Berg and W. Veen, (2013a). Investigating teachers' perception about the educational benefits of Web 2.0 personal learning environments. eLearning Papers, 35.

[42] Couros, (2010). Developing personal learning networks for open and social learning. Emerging technologies in distance education, 109-128.

[43] T. Väljataga, K. Pata, M. Laanpere, and M. Kaipainen, (2007). Theoretical Framework of the iCampFolio–New Approach to Comparison and Selection of Systems and Tools for Learning Purposes. Creating New Learning Experiences on a Global Scale, 349-363, Springer.

[44] M. Johnson, and O. Liber, (2008). The Personal Learning Environment and the human condition: from theory to teaching practice. Interactive Learning Environments, 16(1), 3-15

[45] T. O'reilly, (2007). What is Web 2.0: Design patterns and business models for the next generation of software. Communications and Strategies, 65(1), 17-37.

[46] S. Paavola and K. Hakkarainen, (2005). The knowledge creation metaphor–An emergent epistemological approach to learning. Science & Education, 14(6), 535-557.

[47] M. D. Merrill, (2013). First Principles of Instruction: Identifying and Designing Effective, Efficient, and Engaging Instruction. San Francisco, CA: Pfeiffer.

[48] C. Kim, M. Kim, C. Lee, J. M. Spector and K. DeMeester, (2013), "Teacher beliefs and technology integration", Teaching and Teacher Education, Vol. 29, pp. 76-85.

[49] R. Koper, (2014) Conditions for effective smart learning environments. Smart Learn. Environ. 1, 5 https://doi.org/10.1186/s40561-014-0005-4

[50] G. J. Hwang, Definition, framework and research issues of smart learning environments-a context-aware ubiquitous learning perspective. Smart Learning Environments 1(1), 1–14 (2014)

[51] T. Kim, J.Y. Cho, B.G. Lee, (2013) Evolution to smart learning in public education: a case study of Korean public education, in Open and Social Technologies for Networked Learning, ed. by L. Tobias, R. Mikko, L. Mart, T. Arthur (Berlin Heidelberg, Springer), pp. 170–178

[52] K. Scott, R. Benlamri, Context-aware services for smart learning spaces. Learning Technologies, IEEE Transactions on 3(3), 214–227 (2010)

[53] R. Huang, J. Yang, Y. Hu, (2012) From digital to smart: the evolution and trends of learning environment. Open Educ. Res. 1, 75–84

[54] K.S. Noh, S.H. Ju, J.T. Jung, An exploratory study on concept and realization conditions of smart learning. J. Digit. Convergence 9(2), 79–88 (2011)

[55] J.M. Spector, Conceptualizing the emerging field of smart learning environments. Smart Learning Environments 1(1), 1–10 (2014)

[56] R.G. Hollands, Will the real smart city please stand up? Intelligent, progressive or entrepreneurial? City 12(3), 303–320 (2008)