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Theoretical Underpinnings of the guided Personal Learning Environments Model

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Theoretical Underpinnings of the guided Personal Learning Environments Model

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Abstract: Guided Personal Learning Environments (gPLEs) model is a PLE design and development framework that incorporates teacher-based guidance mechanism in online learning environments. The model contributes to "support" or "guidance" element, that is one of the most important components of the PLE concept. This paper discusses the gPLEs model with respect to its foundations in popular social and learning theories and pedagogical models. The aim is to prove that teacher-based guidance is essential both for physical learning environments and for virtual learning environments. This paper contributes to the body of knowledge on PLEs and e-learning environments in at least three ways. Firstly, explanation of gPLEs model's features provides sufficient evidence for the needs of the teacher-based guidance element in online learning environments. Secondly, it gives a greater understanding of whether and how relevant social and learning theories support gPLEs model. Last but not least, benchmarking gPLEs model's features against relevant theories sets a theory verification standard for researchers in this field. This work has implications on teaching and learning practices across all educational levels and learning types, as it insights on how teaching and learning experiences in the 21st Century should be enriched with emerging social web and learning technologies.

Keywords: Personal Learning Environment, PLE, theoretical foundations, guidance, support.

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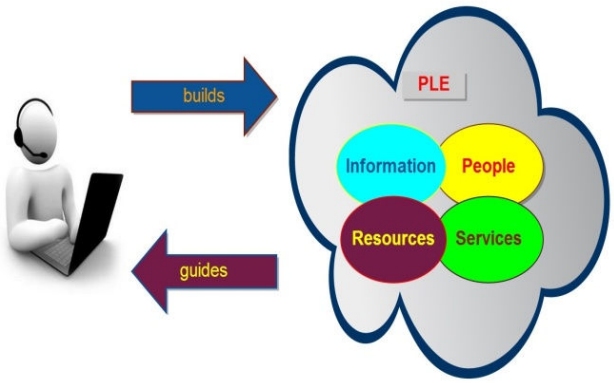
Introduction

Web 2.0, also known as Social Web or Social Media, is constantly adding reusable information in our society through online environments thanks to the Internet revolution and the SM applications in particular. Personalization, collaboration, networking and inquiry-based learning, and open accessibility and interactivity, ease of use and repurposing of information like features of these environments affect teaching and learning practices across all learning types and educational levels (Kop & Hélène 2013, Drexler 2010). These environments offer individuals to combine their personal and professional interests at one place, augment their learning processes, and learn from each other's skills, knowledge, and experiences (Dabbagh & Kitsantas 2012, Siemens 2010). However, abundance of information on these environments causes individuals' information overload problems, such as stress, anxiety, reduced work efficiency, lost from track, and unproductivity (Shaikh, Gillet & Khoja 2015, Gillet 2013, Manouselis et al. 2011). Fortunately, Personal Learning Environment (PLE) concept has implications on the open access online learning and information overload challenges (Verbert et al. 2012, El Helou, Gillet & Salzmann 2010), and learner-based guidance, self-direction and self-regulation issues (Shaikh & Khoja 2012b, McLoughlin & Lee 2010). PLE concept recognizes the interactive, open access, ease of use, and entity-based connection features of the SW (Laurillard et al. 2013, Attwell 2007), which are based on inquiry, collaboration, user-centered design and personalization principles of the learning (Downes 2011, McLoughlin & Lee 2010).

PLE can be defined as an easily customizable learning environment having roots in early personalized learning concepts and contemporary SW-based learning environments. It is conceived, customized and controlled by an individual in her quest to become self-reliant and lifelong learner (Moore 2013). PLE offers to learners inquiry-based, time-sensitive, and social learning experiences which are personalized to their interests and needs (Shaikh & Khoja 2014a, Dabbagh & Kitsantas 2012). Like other SM based environments (such as Facebook, LinkedIn, Google+), learners find relevant information in the PLE through personalized recommendations thanks to the advances in the recommender system technology (Halimi, Seridi-Bouchelaghem & Faron-Zucker 2013). PLE sustains lifelong learning (Manganello et al. 2013). It provides learners an opportunity to appropriate repurpose and contribute to online content, to choose among many learning resources available to them for free of cost, and to conduct autonomous decisions (Shaikh & Khoja 2014b, Gillet 2013, Attwell, 2007).

The gPLEs model is a PLE design and development framework (Shaikh & Khoja 2014b) that offers learners teacher-based guidance or support during their learning course through some implicit or automatic means (Figure 1). This paper discusses the gPLEs model with respect to its foundations in popular social and learning theories and pedagogical models. The aim is to prove that teacher-based guidance is essential both for physical learning environments and for virtual learning environments (McLoughlin & Lee 2010).



Guided Personal Learning Environments Model (Shaikh & Khoja 2014, pp. 782)

The remainder of paper is organized as follows. In the next "The gPLEs Model" section, we explain gPLEs model in details providing its aims, objectives, and contributions. The "Social and Learning Theories and Pedagogical Models Underpinning the gPLEs Model" section discusses whether and how relevant learning theories support gPLEs model. In the end, we summarize our findings and conclusions in the "Conclusions" section.

Guided Personal Learning Environments Model

The gPLEs model seeks to transform Internet users into shrewd learners. The idea is to support online users the way real life users are being supported by parents, teachers, personal advisors and More Knowledgeable Others (Moore 2013, Shaikh & Khoja 2012a, Downes 2011, Drexler 2010, Siemens 2010). The gPLEs model contributes to the support element of the PLE concept through enforcing personalized learning, learner scaffolding, peer instruction, and inquiry principles in online environments through recommender technology (Shaikh, Gillet & Khoja 2015, Shaikh & Khoja 2014b).

The gPLEs model employs three-step-based PLE design and development logic to implement its strategy (Shaikh, Gillet & Khoja 2015). These steps include: (1) identifying PLE-based learning skills of users; (2) devising recommender logic based on user skills; and (3) developing PLE to evaluate recommender results. During the first step, the gPLEs model semantically analyses user interests mined from their profiles on the Internet and teachers' roles for PLE-based learning (hereinafter we call teacher roles) identified by us earlier in (Shaikh & Khoja 2014a) to filter out user skills. In the recommendation generation step, it generates semantic-rich personalized and ranked similarity recommendations (Shaikh, Gillet & Khoja 2015). Later, in third step, PLE named GuidedLearn[1] is developed to share the results.

The gPLEs model is particularly suited for describing the design of PLEs, as it is based on the social learning theories considered crucial for building successful learning platforms (Shaikh & Khoja 2014b). Shaikh & Khoja (2014b) state the central tenet of the gPLEs model as: "that individuals learn best in friendly, socially interactive, diverse, and easy to use environments (design based on personalization, collaboration, autonomy, and needs' assessment); and, that to fulfill their learning needs they investigate resources (inquiry-based learning); and, that to let the World know how they perceive objects and what they are good at, they share and discuss their progresses and achievements with friends (connectivism and

learning that follows collaborative learning principles); and, that environments they conceive help them to manage the learning by letting them available with what they need (supporting environments)."

Aims and Objectives

Based on design principle mentioned above, the aim of the gPLEs model is three-fold; that to prove that: (1) PLE helps individuals to become self-reliant life-long learners; (2) an effective PLE is supported by major social and learning theories and pedagogical models; (3) PLE concept has potential to prove itself as personal e-learning system (Shaikh & Khoja 2014b).

Contributions

Based on PLE design and development guidelines of the gPLEs model, we have developed PLEearn1 and SkillMiner recommender, a recommender system applicable for PLEs (Shaikh, Denis and Khoja, 2015). We summarize both systems hereafter:

GuidedLearn[1] Personal Learning Environment

GuidedLearn[1] (acronym of PLE Learn) is a PLE-based learning environment that is developed on top of SW based design features of the gPLEs model. GuidedLearn[1] targets online environments supporting personalization, collaboration, social interactions, and inquiry, as well as knowledge sharing and management. The model adopts user-driven bottom-up approach prevailing in SW-based environments (El Helou, Gillet & Salzmann 2010). The gPLEs model is based on five design principles considered essential for developing useful PLEs (Shaikh & Khoja Unpublished): "(1) implementation is facilitated with building on preceding social learning theories and pedagogical models, at the same time keeping the right level of formalism and abstraction; (2) interaction and learning contexts are represented in an adaptable manner; (3) formal and informal learning scenarios are both supported; (4) SW is merged together with the flexible bottom-up content and activity management services; and (5) SW features are integrated in order to stimulate active participation and social interactions."

Skill Miner Recommender

The SkillMiner recommender (Shaikh, Gillet & Khoja 2015) is built on design principles of the gPLEs model and provides two main functions in an online PLE: "(1) arranging entities in a platform according to their expected significance to the target user skills, enhancing the work and learning effectiveness; (2) persuading new interaction and learning prospects by recommending new and potentially attractive people relying on the target user's skills."

Next, we discuss major social and learning theories, and pedagogical models underpinning the gPLEs model in particular, and the PLE concept in general.

Social and Learning Theories and Pedagogical Models Underpinning the gPLEs Model

In this section we benchmark gPLEs model's features against major social and learning theories and pedagogical models. We discuss both traditional and contemporary teacher-centric and student-centric social and learning theories. For proof of concept and reference, we have provided GuidedLearn[1], a PLE that is developed following design principles of the

gPLEs model, and SkillMiner, the recommender model of GuidedLearn[1].

Objectivism

Objectivism is a teacher-centric learning theory which holds that human knowledge and standards are objective, and that knowledge is reliably based on observed objects and events (Tam 2000). According to Jonassen (1999), objectivism assumes that knowledge cannot be created by thoughts that one possesses. It advocates the virtues of rational self-interest, such as consciousness, identity, independent thinking, productivity, justice, honesty, and self-responsibility (Bernstein 2011). Vrasidas (2000) adds that objectivist conceptions of learning assume that knowledge can be transferred from teachers (or transmitted by technologies), and acquired by students. These learning conceptions include analysis, representation, and re-sequencing of instructional content and tasks in order to make them more predictably and reliably transmissible (Bernstein 2011, Tam 2000).

The gPLEs model sees PLE as a manipulable, customizable, and productivity-increasing learning environment that fosters virtues of identity, productivity, autonomy, and self-regulation in its users (Shaikh & Khoja, 2014b). Deriving insight from "Planning and Design" competence of teacher roles (Shaikh & Khoja 2014a), gPLEs model presents user recommendations of similar and dissimilar people in ranked order of one's similarity score against others (Shaikh, Gillet & Khoja 2015).

Instructivism

Teacher-centered Instructivists' learning theory refers to direct instruction employing curriculum-related objectives and lesson plans customarily using lecture method (Reeves & Reeves 1997). Instructivists, as stated from Reisman (1994) and Reeves & Reeves (1997), stress the importance of goals and objectives that exist apart from students. Gardiner (1998) adds that direct instruction demands content to be sharply defined and learning strategies to be focused as directly on prespecified content as possible.

Leveraging on the "Planning and Design" competence of teacher roles (Shaikh & Khoja 2014b), gPLEs model provides accurate, semantic-rich recommendations to an user on a scale of five ranks (Shaikh, Gillet & Khoja 2015). Its recommender strategy is based on clear objectives and it is sharply defined. SkillMiner performs semantic analysis of user interests and teacher roles in order to develop user skills (Shaikh, Gillet & Khoja 2015).

Behaviorism

Behaviorism is a teacher-centric learning philosophy which holds that all behaviors are acquired through conditioning (Kotler 2013). It is primarily concerned with observable behavior as opposed to internal events like thinking. Behaviorism assumes that individuals start off as a clean slate, and that they learn by responding to their surroundings, and to activities of people and objects around them (Brown & Rodney 2000).

Learning from "Communication and Interaction" competence of teacher roles (Shaikh & Khoja 2014a), gPLEs model copies observable behavior in users' cognition through conditioning criteria. It obtains conditioning information about user needs through their

profiles over the SW (Shaikh, Gillet & Khoja 2015). Behavioral performance and retention power of users will increase when they explore users recommended to them through SkillMiner recommender.

Cognitivism

Cognitivism, a teacher-centric pedagogical model, defines the learning as a process of creating and evaluating information by involving reasoning, clear objectives and problem solving techniques (Jonassen & Grabowski 2012). Cognitivist paradigm focuses on inner mental activities of users and uses metaphor of "mind as computer". Cognitivists, as stated from Haugeland (1978) and Galotti (2014), stress that the black box of the mind needs to be opened and understood.

Shaping PLE requires users to encode, store, and retrieve information, apply visuals to artifacts and use tools, widgets and applications to carry out tasks related to their learning (Gillet 2013). The gPLEs model, leveraging on "Use of Technology" competence of teacher roles, stimulates brain reasoning and problem solving techniques of users (Shaikh & Khoja 2014a). GuidedLearn[1] provides user recommendations in proper shape (e.g., block or page), format (e.g., tabular or scrolling), order (e.g., sorted or ranked), place (e.g., left side or right side of page), and context (instantly based on interests provided) that augment their inner mental activities (Shaikh, Gillet & Khoja 2015).

Humanism

Student-centered or learner-centered theory "Humanism" focuses on human freedom, dignity and potential (Aloni 2002). Humanism epistemology views learning as a personal act to fulfill one's potential. A central assumption of humanism epistemology is that the people act with intentionality and values (Marquardt & Waddill 2004). Affective and cognitive needs are the key to Humanism. The ultimate goal of Humanism is to develop self-actualized people in a cooperative and supportive environment (Aloni 2002).

The gPLEs model helps individuals to become self-regulated and lifelong learners. It sows the seeds of freedom, smartly working, interdependence and mutual respect in learners. Learning from "Management and Administration" competence of teacher roles, gPLEs model invites learners to explore objects on their own, and to learn from each other's experiences and skills. It helps learners to learn their way and achieve goals. In GuidedLearn[1], learners get teacher skills, knowledge and experience-based feedback about accessing, aggregating, configuring and manipulating objects (Shaikh, Gillet & Khoja 2015).

Constructivism

Constructivism, a student-centric pedagogical model, looks on the ways that individuals learn (Tam 2000). Constructivism epistemology holds that knowledge is presented explicitly, and constructed personally when interacting with other learners and the physical world (Vrasidas 2000). Constructivists, for example Shuck (Shuck, Carlos & Marina 2013) and Papert (Papert & Harel 1991), believe that acquisition of knowledge is not sufficient to education, but it is the sense the learners make that matters the most. They view learner as a person who acts on objects and events within its environment and which in a process gains

understanding and derive meaning from those objects and events.

Shaping, crowding and organizing resources in a PLE provide learners opportunity to reconstruct their knowledge about people, world objects and events. GuidedLearn[1] not only offers learners to interact with their learning environments in a better way, but it also supports their such knowledge construction activities through recommendations, user-centered design and SW-based plugin support features (Shaikh, Gillet & Khoja 2015).

Connectivism or Networked Learning

Connectivism or Networked Learning is the integration of principles explored by the Chaos, Network, Complexity and Self-organization theories (Siemens 2010). It is a student-centric pedagogical model which holds that learning and knowledge rests in diversity of opinions, and that knowledge is focused on connecting specialized information sets, and that connections which enable learners to learn more are more important than learners' current state of knowing (Downes 2007). In connectivism, currency is the intent of all Connectivist learning activities and decision-making is itself a learning process (Siemens 2010).

The gPLEs model envisions a PLE where people and communities, objects and events, tools and resources, and learner and learning interact and interconnect easily and flexibly. Exploiting "Communication and Interaction" competence of teacher roles, GuidedLearn[1] offers learners to connect with other people (e.g., peers, teachers, experts), and information resources (e.g., posts, photos) to get their knowledge, skills, and experiences updated (Shaikh & Khoja 2014a).

Constructionism

Constructionism, a student-centric learning model, is the blend of Constructivists and Problem-based Learning theories (Papert & Harel 1991). Constructionism can be described as a knowledge construction process that holds that learners construct knowledge while solving problems in a real life. It is a "trial and error" method known as "learning by doing" or "learning by making" that recognizes artifacts' development by learners during the learning course (Laurillard et al. 2013). Shaping learning environment, devising strategies to solve problems, coding, simulating a process are some examples of the Constructionism theory.

The gPLEs model extends Constructionism idea and assumes that learning occurs when learners build learning environments. The gPLEs model offer learners to construct their learning environment. GuidedLearn[1] provides learners with required tools to construct and customize learning environment according to their tastes (Shaikh, Gillet & Khoja 2015). Such experiential learning activity enables learners to develop, refine and reconstruct their views about world objects (Papert & Harel 1991).

Andragogy

User-centered "Andragogy" philosophy is the study of teaching adults to learn (Knowles, Holton & Swanson 2005). Andragogy holds that adults are self-directed; thus they are capable enough to take responsibility for their learning and achievements. Merriam (2001) describes that the teacher in andragogical practices plays the role of a guide that helps learners to define

their learning goals and the learning environment that takes care of learner needs.

GuidedLearn[1] performs two roles during the learning process of a learner: the role of a teacher and the role of a learning environment (Shaikh & Khoja, 2014b). At one side, it guides individuals to their learning path through SkillMiner (Shaikh, Gillet & Khoja, 2015) and at the other side, it lets them know tastes of their friends through timeline, posts, photos and chat features.

Personalized Learning

Personalized learning, or sometimes referred as personalizing the learning experience, is student-centric learning model that offers tailoring of pedagogy (adjusting pace and approach), curriculum and learning environment in accordance with learner needs (McLoughlin & Lee 2010, McRae 2010). Personalized learning holds that learner is active co-designer of its learning path (Miliband 2006).

The gPLEs model stands strictly with the notion of personalized learning. It triggers support in learner environments without affecting the core "personalization" construct (Shaikh & Khoja 2014b). GuidedLearn[1] enables individuals to design environment they dream of, develop their learning strategy and follow it, and connect with people and resources consistent to their needs. SkillMiner has provided that recommendations are personalized for learner preferences (i.e., current knowledge level, learning goals and needs) which are based on SW design principles (Shaikh, Gillet & Khoja 2015).

Discovery or Inquiry-based Learning

Discovery learning, a student-centric pedagogical model, engages learners in knowledge construction activity through inquiry process (Powell & Kalina 2009). Discovery learning is about "discovering or proposing a problem"; "gathering data" to develop its understanding; "developing hypotheses" to propose solutions; "confirming hypothesis" if any solution is confirmed and follows set standards; "solving it" through developing a solution package. According to Looi et al. (2011), pedagogical aims for discovery learning are threefold: (1) to promote deep learning; (2) to promote meta-cognitive skills; and (3) to promote learner engagement.

Leveraging on the "Communication and Interaction" competence of a teacher roles (Shaikh & Khoja 2014b), gPLEs model inculcates discovery and inquiry-based learning qualities in learners. GuidedLearn[1] encourages individuals to discover objects around them on their own, to develop learning environments based on their preferences, and to learn new skills they need of (Shaikh, Gillet & Khoja 2015). GuidedLearn[1] helps learners to (1) keep their environments up to date, which promotes learner engagement; (2) keep exploring new opportunities, which promote meta-cognition; (3) reflect to recommendations if they find them interesting, which promotes deep learning.

Situated Learning

Pedagogical model of Situated Learning is student-centric and based on notion that knowledge is contextually situated and fundamentally influenced by activity, context and

culture in which it is used (Jonassen 2004). McLellan (1996) argues that situated learning is essentially a matter of creating meaning from everyday life activities of daily living where learning occurs relative to environments we live in (e.g., field trips, cooperative education, internship experiences, lab trainings, virtual environments based learning, etc.).

PLE building activity is a real world example of situated learning (Gillet 2013). In the PLE building activity, like in real world work context, learners are immersed and physically active as like they work in real life situations. The gPLEs model allows learners to replicate their real world activities in their online PLEs. It has embedded prevailing SW design principles in GuidedLearn[1]. Getting insight on "Management and Administration" competence of teacher roles, gPLEs model provides learners' feedback and technical assistance as and when needed (Shaikh & Khoja 2014b). Its recommendation strategy is based on "one work at one time" principle. SkillMiner sends recommendations to active learner with five seconds interval (GuidedLearn[1]), which allows and develops "one work at one time" habit among individuals.

Authentic Learning

Authentic learning, a student-centric learning strategy, is a real life learning experience which provides learners with authentic learning contexts to reflect the way knowledge is used in real life situations (Herrington & Kervin 2007). For authentic learning to occur, learners must be engaged in an inquiry-based realistic task that provides them with complex collaborative activities and knowledge construction opportunities. Herrington, Reeves and Oliver (2003) argue that authentic learning environments provide coaching and scaffolding support to learners through teachers or coaches in critical times, promote learner reflection and articulation to form abstractions, and provides means that let learners' tacit knowledge explicit.

The gPLEs model is based on personalization, collaboration, inquiry, and learning by design principles, which are considered as integral components of any modern learning environment (Shaikh, Gillet & Khoja 2015). In GuidedLearn[1], gPLEs model provides authentic real life, collaborative effort and inquiry-based problem solving contexts to learners that reflect the way individuals use knowledge in real life situations. Adding to that, SkillMiner inculcates teachers' scaffolding, reflection, articulation and assessment-based support in learners through recommendations (Shaikh, Gillet & Khoja 2015).

Findings

The gPLEs model fosters meaningful learning competencies in learners which enable learners to define their learning goals, design useful models, conserve with people and resources and participate in knowledge construction practices. It inculcates teacher-centered and learner-centered learning competencies in learners. Teacher-centric skills include: intuition, reflection, productiveness, brain reasoning, conceptualizing, etc. Learner-centric skills include: knowledge construction, articulation, conversation, self-regulation, collaboration, balance of power, etc. (Figure 2).

Skills that gPLEs Model inculcates in Learners

This paper contributes to the body of knowledge on PLEs and e-learning environments in, at least, three ways. Firstly, explanation of gPLEs model's features provides sufficient evidences for the needs of the teacher-based guidance element in online learning environments. Secondly, it lays to a greater understanding of whether and how relevant social and learning theories support gPLEs model. Last but not least, benchmarking the gPLEs model's features against relevant theories sets a theory verification standard for researchers of this field.

CONCLUSIONS

The gPLEs model adds a novel yet authentic teacher competences-based guidance mechanism in PLE concept which is based on teacher insights and experiences for PLE-based learning practices. Thus, whether considered as technology that allows learners to fulfill their learning without compromising on personalization, or teaching and learning approach that offers contemporary teaching and learning experiences, gPLEs model provides suitable way for facilitating learners' interaction and use of emergent learning technologies into learning.

In this paper, we discussed and established also a contemporary learning theories underpinning the gPLEs model. The aim was to prove that (1) the gPLEs model has roots in major learning theories and pedagogical models, and that (2) gPLEs model inculcates in learners the essential learning skills which are paramount for learning in the 21st Century phenomena.

This work has implications for teaching and learning practices across all educational levels and learning types, as it insights on how teaching and learning experiences in the 21st Century should be enriched with emerging social web and learning technologies.

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