Facilitating the Development of Self Directed Learning through the Design of an e-Socioconstructivist Learning Environment (eSCLE)

FOO SZE-YENG & RAJA MAZNAH RAJA HUSSAIN
University of Malaya

ABSTRACT
To help adults learners stay competitive in the changing work environments of the 21st century, the teaching and learning of adult learners ought to transition from the traditional didactic school of education to embrace self-directed and social forms of learning. This study proposes a conceptual framework of a mediated activity system in developing the e-socioconstructivist learning environment (eSCLE); which is a learner-centred environment incorporating the design of a physical and virtual learning space conducive for constructing knowledge and building upon existing knowledge in collaboration with others. The design of the eSCLE is a preliminary research attempt to develop instructional learning environments that reflect the unstructured seamless nature of lifelong self-directed learning. It was conducted among a cohort of Master of Instructional Technology (MIT) students enrolled in the Instructional Design and Development (IDD) Course in a local Higher Institution of Learning. Findings from survey questionnaires, content analysis, observation and interview reveal systemic tensions faced by learners in self-directing their learning in the eSCLE where it is suggested that appropriate balance and discretion in managing conflicting situations is needed. The integration of web-based technology is found to be able to scaffold self-directed learning as collaborative mediating tools where functional roles of both instructor and learner-determined web tools enable self-directed actions. Finally, the designed eSCLE is able to facilitate the development of self-directed learning as learners transition through various self-directed learning phases in a steep learning curve, towards continuous lifelong learning.

Keywords: Instructional Design, Self-directed learning, Learning environment
INTRODUCTION

The 21st century is a knowledge-intensive era where the amount of information increases exponentially. With a high employee turnover rate of 12.2 per cent in the Malaysian job market (Chuang, 2010), the region is seeing employers aggressively and selectively recruiting for quality candidates. At the same time, employees hop from job to job seeking better pay and opportunities. Continued professional development is thus essential for job security and the concept of re-skilling on the job through own initiative is crucial. In terms of nation building, the challenge is in equipping a highly educated, self-motivated, capable and innovative workforce in order to cope with the generation and application of new knowledge.

Malaysian higher institutions, in contributing to the quality of graduate employees, ought to inculcate the commitment to learn self-directedly beyond the formal schooling years. It is reported that there is still reluctance and resistance among certain learners to take control of own learning and generally lack of active participation and overall academic endeavour during tutorials (Pandian & Aniswal, 2005) in the local higher education arena. The concern is that prevalent teacher-directed learning processes inhibit valuable opportunities to develop self-directed learning skills such as goal setting, metacognition, mistake detection, preflection (choosing appropriate tasks for learning) and reflection (van Merrienboer & Sluijsmans, 2009; van Merrienboer & Kirschner, 2007) and perpetuates the failure-to-learn-in-school scenario.

OBJECTIVES

In view of the aforementioned global and local concerns, this study aims to design an instruction that is able to develop self-directed learning among higher education adult students, and to seek and identify the instructional activities and conditions which facilitate successful self-directed learning in a blended learning environment. Thereby, fulfilling the significance of the study to inform policy makers, researchers, university instructors and improve future decision making process for the development of learner-centred and self-directed instruction. This study also aims to provide a methodological direction for the development of
self-directed instructional design in developing the instructional design and development knowledge base (Richey & Klein, 2007).

**RESEARCH QUESTIONS**

Three research questions were used to guide the research to gain greater understanding into the role of social collaboration in developing SDL as in "how adults engage in self-directed learning using social networks and peer support groups for emotional sustenance and educational guidance." (Brookfield, 1995), to investigate into the specific role of web tools for its mediating capacity in supporting students' self-directed learning through social participation, and to find out the developmental phases of SDL within the designed activity contexts. The research questions are:

i) How does the designed activity system facilitate the development of self-directed learning in an e-socioconstructivist learning environment (eSCLE)?

ii) How are web-based technologies integrated to facilitate the development of self-directed learning in an e-socioconstructivist learning environment (eSCLE)?

iii) How do the phases of transition facilitate the development of self-directed learning in an e-socioconstructivist learning environment (eSCLE)?

**REVIEW OF KEY CONCEPTS**

*Self-Directed Learning*

The concept of self-directed learning originates from humanistic researchers such as Rogers (1961) and Maslow (1970); and if can even be traced to John Dewey (1916), who defined education as the agency that facilitates the unlimited potential for growth and development that each individual is born with, hence forewarning teachers not to control or interfere with learners' learning process. The enduring influence of Dewey (1916) is evident in higher education, where emphasis on contemporary learner-centred approaches in the higher institutions of learning share common goals to develop student responsibility and autonomy in learning towards sustainable lifelong learning skills.

The most established definition of self-directed learning, used to form the basis of this study and many others, is developed from Knowles
(1975:18) original concept as “a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes”.

**e-SocioConstructivist Learning Environment (eSCLE)**

An e-Socioconstructivist learning environment is a learner-centred environment that incorporates the design of a physical and virtual learning space (also known as a blended learning environment) conducive for constructing knowledge and building upon existing knowledge in collaboration with others. The 'e' in e-socioconstructivist learning environment relates to electronic or technology-integrated learning where in this study, the eSCLE recognizes the unique set of opportunities and limitations offered by web technology; integrating the appropriate web tools in a socio-constructivist learning environment. It is a learning environment represented by a balance of instructor and learner control and a balance of individual and social learning in an online milieu (Salamons 2009).

In the eSCLE, learners construct meaning from collaborative e-learning activities and instructors provide support to help prevent learner isolation or separation from the interactive process in online milieu. Web tools are used as scaffolding tools and thus selected with careful consideration together with an appropriate mix of delivery methods, in cognizance of the individual instructional strength inherent in each technology (Chen 1997) as a facilitator to learners personalized needs (Huang 2002).

In order to personalize self-directed learning in optimal learning conditions, a blended learning environment consisting of various event-based activities was prescribed. Other than the weekly face-to-face classroom learning, learners’ development (of learning to learn) is monitored via various e-learning platforms – Moodle, Google Docs, Wikispaces.
CONCEPTUAL FRAMEWORK

The development of the eSCLE is an adaptation of the activity theory (Engeström, 1999), and is designed to facilitate self-directed learning in a mediated activity system; within the social, cultural and technical aspects of human actions (Figure 1), which highlight the significance of learning environment and participation in contextualized activities.

The designed activity system is a collective community of multiple points of view, where the unit of analysis is not based upon individual self-directed learning activity but division of labour, as schematized in activity theory (Engeström 1999). The eight components of the activity system consisting of activity, object(ive), subjects, tools, rules and regulations, division of labor, community and outcome are translated into the context of this study. As conceptualized in Figure 1, both subjects (instructor and learner) are committed to actions (involved in doing) directed to the objects of projects, tasks, problem solving, reflection, discussion and evaluation within the community of the Instructional Design and Development(IDD) class and the client of the ID project.

Figure 1: Designing for Self-Directed Learning in an e-Socioconstructivist Learning Environment

143
Borrowing the idea of mediation in activity theory, self-directed learning experience is "shaped by the tools and sign systems" used (Nardi 1996). The mediating tool within the activity system refers to the computer-supported collaborative learning potential of web-based technology which helps transform the learning environment into a socio-cultural learning web suitable for the support of the outcome of self-directed learning.

This conceptual framework recognizes a wide range of factors within the localized instructional activity system that could impact the achievement of an objective or outcome. Rules that are imposed by the instructional / social community may affect designed activity. Therefore, the subjects provide feedback of each other in an effort to share the responsibility of facilitating and engaging self-directed learning through goal directed actions. Furthermore, contradictions or tensions within activity systems need to be analyzed appropriately for its role as the agents of change and development (Engeström 1999). In this case, the tensions subjects face as old elements (eg: traditional pedagogies and familiar technologies) interact with new mediating tools and objects (Figure 1) is examined as an initial attempt to improve teaching and learning towards self-directed and lifelong learning.

METHODOLOGY

The research employed the design and development design (Richey & Klein, 2007) and was conducted among 14 postgraduate students enrolled in the Instructional Design and Development (IDD) course. A qualitative orientation was adopted to enable naturalistic and in-depth examination of the perceptions, instructional processes and learning experiences of the participants. The objective was to gain insight and lessons learnt from the procedures and conditions of the instructional design, while addressing the validity of processes and techniques employed which facilitates their use in the specified context.

Survey questionnaires were administered at the beginning and end of the course to help the instructor plan, design and evaluate the learning experience that takes into account the needs and development of individual students. At the same time, the questions were aimed at providing self-awareness and strategies that facilitate students to reflect and evaluate their own learning. Feedback through data collection tools
such as the learning contract, online discussions, course evaluation and reflection diaries were used strategically and periodically throughout the course to help students develop the metacognitive component of self-directed learning, as part of the individual or group learning process and progress.

Throughout the 14-week semester, field observation on the site (physical and virtual learning environment) was conducted, to examine and collect data, to implement interventions or the application of skills and knowledge to the group. Some sensitizing concepts observed were facilitation, implementation of instruction/training, learning processes, learning outcomes, learning products, learning impacts.

Also, various artifacts such as discussions between teacher-learner and learner-learner (on Moodle, Google Wave, Facebook), participants' shared learning contracts (on Google Docs), group project and reflective diaries (wikispaces and Google Sites), course and design information (proforma, worklog,) were gathered and stored electronically for retrospective content analysis.

Finally, selected participants were invited for informal interviews conducted in private with individual participants to get confirmation or verify response following public accounts from documents listed before. Interview questions were semi-structured and prepared according to categories of interest. They were used as a guide in the facilitation of discussion and conducted using Facebook chat within three months after the end of the course.

Data analysis was iterative and emergent, occurring simultaneously with data collection and data processing to facilitate check-and-balance procedures, and to help minimize biases and errors alongside fieldwork and fine-tune research methods as appropriate.

FINDINGS AND DISCUSSION

Research Question 1

In the course of practicing and developing self-directed learning in the designed eSCLE, the components of the activity system in its subject, object, mediating tool, community, rules and division of labour (Refer Figure 1.2) interact to feature contradictions (also known as tensions or conflicts) in the following categories:
i) option vs. obligation  
ii) certainty vs. ambiguity  
iii) theoretical vs. practical  
iv) learner autonomy vs. teacher control  
v) match vs. mismatch  
vi) process vs. product

These accumulated structural tensions generated a mix of resistance and acceptance behavior within the activity system as a result of innovative attempts to change the dynamics of control (learner self-directedness) within the activity system. The voices of the subjects suggest how an eSCLE activity system should be developed to facilitate the development of self-directed learning. A balanced approach to the six contradictory constructs is suggested through examples discussed below:

**Option versus Obligation**

The option of choosing tasks, own partner, and topics in the course was empowering as according to L5, *“we can decide which choice will benefit us the most”*. Learners could choose tasks that they are more comfortable with that could take away some of the *“fear of failure”* in learning self-directedly. The option of choosing one’s own partner produces more effective group work as there is a *“positive spirit in working with people I like...the mood and ideas were flowing and things get done fast. We have more varieties of talents”* (L10). Also, the choice of topics from the eight given titles in one task provided more confidence, motivation and *“excitement”* in *“doing something that (l) am familiar with and know that that is my strength and the assurance that i can provide the best of me and my team for the client.”* (L9)

However, in some cases, learners prefer to be given less of an open option to save time and energy. In the video editing assignment, L5 lamented that the freedom of choosing the editing software after learning the mechanics self-directedly had them *“stay up until midnight and it was very very stressful bec we’re tired... The problem is it took a lot of time searching for the right one.”* (L1)

Therefore, choice in learning is needed in equilibrium to empower self-directed learning while easing the stress of failure. The manner *choice* is administered has to be regulated, because unlimited and unrestricted
choice could lead to 'choice overload' and may debilitate rather than liberate certain individuals.

**Certainty versus Ambiguity**

The fear of the unknown is common even among adult learners and should not be taken lightly, especially due to the lack of exposure to complex real-life learning contexts among Malaysian undergraduates; who confess to be "afraid that I cannot deliver... no experience at all in working with real clients during my undergraduate years". (L14) It is interesting that a learner became "cautious" at "the thought of applying what I've not yet learned in completing the assignment" (L2).

Feelings of ambiguity could lead to disorientation, not knowing where and how to start on the task.

"we are like torn between, either to deliver and fulfil the client's wish or to fulfil our instructor's wish... where do I begin?" (L13)

On the contrary, learners looked forward to something on their 'wanted' list; subjects that they expected to learn about in the course and now given "the opportunity to experience" (L6) and to "engage into knowledge and skills of designing media" (L11). Many times, the expected is related to what is assessed in the course requirements "to fulfil the course requirements" (L3)

Nonetheless, instruction that has tasks anchored upon what learners expect through a pre-course survey could provide appropriate scaffolds. Uncertainty needs to be introduced within a framework of structure to balance the feeling of helplessness. As L8 acknowledged, "the course designer has done a great job in seeing the probability in the uncertainty of constructive learning".

**Theoretical versus Practical**

According to the instructor, the self-directed learning expected of the learners is in "engaging with the project that requires ID knowledge and skills therefore there was 'less of formal ID lecture'.

A self-directed ID would enable learners to see the realistic connections between tasks, so that the relevant theoretical principles are applied according to practical urgencies through "learning while doing... leads to understanding". (L7)
The instructor's concept of teaching competencies in instructional design is to provide the know-hows through practice which leads to the self-discovery of theoretical principles. In this structure of learning, a learner (L8) revealed she was “digging for information day-in and day-out” which was “exciting in our study group”. This learner represents the group of learners who see the benefits of self-directed learning through discovery and experiences, which often times is, according to L11 “more meaningful... to see how instructional designer apply theories to do work in real-life”.

Others who require the instructor-directed theoretical input throughout learning “want the instructor to keep me at the right track... help me to fill my knowledge gaps... i dont know, maybe we used to teacher center methods, we always think something is missing...” (L13)

Apparently, some couldn’t cope with picking up theoretical skills and knowledge self-directedly as embedded in the practical learning. Practising the competencies instructional design on top of self-directed learning skills could pose an additional load as learners may “know what to do but how to do it is a big problem”. (L3)

Acknowledging individual differences in the way learners are able to assimilate and focus on the procedural mechanics of problem-solving in practical ID, a balance of the theoretical knowledge and practical competencies would give less prepared learners better leverage to ‘know how’ to solve problems by consulting their knowledge storehouse of ‘know what’. In a self-directed curriculum, theoretical knowledge could still be imparted, but less through direct instruction and more through scaffolded inquired discovery.

**Learner Autonomy versus Teacher Control**

In any teaching and learning setting, instructors should be aware that every learner has his own expertise. Some learners, represented by learner L8, are aware of their capability and would like to be given the trust to use them to self-direct their learning.

“i have my own business, and photography and videography is my forte. so my knowledge on that helps me to choose the options given by the client” (L8).

In the study, learners were given the freedom to seek other human and non-human resources in friends, web sources and the instructor.
Facilitating the Development of Self-Directed Learning through the Design

In order to moderate the full-rein of learner autonomy, the instructor shares how "intuition" is needed to "sense" when to be the guide on the side and when to be the sage on the stage so that the learners "are able to make sense of the ID tasks and to make meaning of the tasks that they are performing" in their own controlled pace. "Just-in-time" design of instruction was practised, which the instructor likened to,

"Just like having a drip medication, turn the tap when needed, you can't give too much it will be bad for the body. KS (*knowledge and skills) given when needed. Or rather prescribed when needed".

The role of the instructor was "co-learner... learning from them (the students)" in order to liberate learners to learn self-directedly, "to take initiative, responsibility and participate actively to fulfil my own learning goals". (L10) Correspondingly, many learners were happy to be co-teachers as an acknowledgement of their expertise and to build up transferable skills. According to learner L9:

"After working on these assignments and sharing with my team what I knew from before, I feel my understanding on how to design training programs and resources grew a lot more, and now I can see a bigger picture in regards to training". (L9)

In short, learners need to be given autonomy together with guidance to the appropriate resources in order to balance the lack of teacher instruction in self-directed classrooms.

**Match versus Mismatch**

Learners responded differently to the tasks as all three were of different nature, requiring different skills and knowledge. The shared learning contract was largely metacognitive while the instructional video and the ID project required hands-on participation. At the same time, the instructional video required more technical knowledge of editing technologies while the ID project was "complex and unforeseen"(L9). Thus, learners were able to pinpoint tasks that belonged in their "comfort zone"(L5) or others that just "somehow did not intrigue"(L5) them.
The comments from different learners show how one task cannot satisfy the preferences of every learner. Mismatch is found in terms of skills and knowledge required (cognitive diversity):

"requires tremendous amount of analytical skills and sometimes i feel overwhelmed. Furthermore, usually, the time frame for an ID project is very short... (L6)

"without content expertise... it slow down the process tremendously and become frustrating"(L1)

Also in terms of learning style (learning style differences):

" i am kind of person who needs to be in context, to feel, touch, and understand' (L6)

if we dont know the whole picture, how we know what can be let go and what cant (L9)

i am one person who learns through talking things out (L5)

Constraints in terms of time form a mismatch in terms of ease in adoption:

"with the time frame given, if I did not have video editing skills, would have a very hard time"(L7)

"stressful when time is the constraint" (L6)

However, there are two sides to a coin; dealing with tasks that are out of the learners' comfort zone provides learners with skills of adaptation, "it probably made us more aware about different ways to deliver the topic". (L14)

All in all, a balance of both matched and mismatched learning events appeared to be useful to help learners engage readily in self-directed learning with the former experience, and to acquire adaptation skills which are useful in real self-directed learning situations with the latter.

**Process versus Product**

Learning ID as in self-directed learning is "the hardest phase" because of the "ongoing process...learning phase to improve myself"(L8). The reality is that
focusing on processes of self-directed learning helped learners reflect and adapt and “think about how I learn”.

The evaluation system should reflect the importance of process in learning, allowing trial and error to be part and parcel of developing ID competences. The process of regaining renewed understanding should be assessed as much as the product alone.

throughout the semester, I believe that we learnt a lot about instructional design, through guidance from the instructors and majorly from trial and error (L2)

However, the developmental processes need to be guided to relieve emotional anxiety and strayed discussion, at least in the context of producing a product within a short-term. With the help of web tools, the externalization of self-directed learning processes through the processes of tasks develops members of a learning community.

"Giving their peers access to their LC gives the opportunity for others to see other people processes in learning, and that would provide much opportunity for the students to reflect and compare themselves with others..." (L8)

A healthy process of self-directed learning within a socio-constructivist community of learners leads to transformative learning.

"after that sem, I had to work on flash software. Somehow, I sort of know what to do. I did it all by myself from reading from a website about How To..” (L13)

Hence, it is learnt that a process approach to learning (eg: how to learn, how to do something, how to solve a problem) facilitates developmental growth of self-directed learning. In promoting a process approach, trial and error and healthy collaborative experimentation are considered a worthwhile effort in developing a lifetime habit of continuous self-directed learning. A balanced emphasis on supporting self-directed learning activities and producing an end product should be in place in any activity system that aims to develop self-directed learning.

Research Question 2
Web-based technologies were used as mediating tools by the instructors and learners to facilitate learner self-directed learning in a collaborative
manner. The evidences of self-directed learning are categorized by the actions the web tools enabled in facilitating: Investigation, metacognition, collaboration, production, interaction, articulation, evaluation and information.

Investigation Tools
Google applications such as Google Search, Google Docs, Google Wave were able to facilitate the self-directed quest of finding out more.

I became a self-directed learner by asking, searching, reading the information about the ID on the web" (L6)

As learners researched into various web platforms to find the appropriate video editing tool, video explanations (eg: You Tube, Teacher Tube) were most useful in the lack of direct instruction; being able to increase their general knowledge and understanding in the subject. Furthermore, the search for information on various web platforms was an experience in terms of digital literacy.

Exploring the web sometimes results in serendipitious findings, which engages self-directed learning in one’s own learning path. Learners who were engaged, or in a learner’s words “into it constantly” (L7), displayed self-directed learning beyond requirements of course. Appropriate web tools could extend self-directed learning beyond compartmentalized subjects into cross-curricular overall learning. As an example, a learner was enthusiastic to share her project paper proposal, which birthed its ideas in the present class.

Metacognition Tools
While learners searched for knowledge via web tools, they also searched into themselves. Through the shared learning contract hosted on Google Docs, learners were able to externalize tacit information (subconscious information) that is understood in the mind but not necessarily documented.

“Giving their peers access to their LC gives the opportunity for others to see other people processes in learning, and that would provide much opportunity for the students to reflect and compare themselves with others...” (L8)
Facilitating the Development of Self-Directed Learning through the Design

The concept of open self-reflection on a web platform was reassuring for the learners as they had a sense of ‘togetherness’ through the difficult self-directed learning situations.

"I am 'glad' to read others’ difficulty, it tells me the truth that everybody is on the same boat. Then it make you not to feel the fear alone". (L4)

For most learners, the exercise of metacognition through a shared web platform allowed them to become more aware of their capacities and capabilities.

"I like LC too... its like putting something that we don’t know, from there we know what we don’t know; its like helping ourself by doing our own strategy with friend’s help". (L9)

"It’s like learning on our own pace, but then we can share with friends". (L14)

Collaboration Tools
In two of the tasks, teamwork was requisite. So despite the distance, work and social constraints adult learners face, they had to find a solution to solve the perceived problem in the best way.

The wiki was a team-building tool used to bring together developing ideas from all the members for the project. Learners were able to edit, brainstorm and compare points of view on a shared document in the most fitting way.

"The use of our positiveseedtraining wiki became very important for us to share our learning and advances through the whole process. Wikis for me is like working in a puzzle with your group where different people are able to put different pieces together and the final result can be very nice". (L11)

The idea of claiming ownership to the representation of negotiated beliefs and knowledge is empowering to self-directed learners.

In the preparation for the exams, the learners formed an exam discussion board on facebook, which they used to self-directedly recap their learning for the course, to interpret question requirements and negotiate meaning among the community of learners, thus reflecting their personal application of ID.
Interaction Tools
The web tools used supported the need for regular conversations between classes. With the lack of physical meetings, both synchronous and asynchronous interactions via web tools provided constant support for interconnectivity.

“talking things out can help me to relate to things that I read or heard before this”. (L3)

Synchronous conversations on web tools such as Skype provided instantaneous opportunities to connect thoughts for learning at minimal cost. Learners also chose to interact via Google Wave as it enabled spontaneous and distributed self-directed learning.

“I waved to “L3 a few days ago about the learning contract and learn a few tricks of using googledocs” (L.7)

For the instructors, asynchronous web tools such as the discussion forum on Moodle were sufficient to enable them to keep in touch with learners’ progress.

The interaction on web platforms was found to provide an element of surprise or anticipation, which could advantageously promote deeper engagement in sharing.

In actuality, the choice of web tools depends on the situation. For learners not separated by physical distance, the use of asynchronous web tools loses its purposes and is paled in comparison with face-to-face conversations; as in the case of L13 who works in the same organization with the project manager:

“Go to use f2f (face to face) in school with our project manager and can ask question straight forward and get the feedback immediately.” (L.13)

Also, specific web tools may have limitations, for instance in terms of immediacy.

“LC is asynchronous discussion. We were working on it in real time and we need immediate troubleshooting.”
Facilitating the Development of Self-Directed Learning through the Design of Articulation Tools

The shared learning contract hosted on Google Docs provided a platform for articulation of plans, knowledge, views and opinions. Being a shared virtual platform, learners are accountable to the community for their articulated personal strategies. This impels learners to achieve set goals within the targeted timeframe, thus is useful to manage self-directed learning.

The web platform also enabled the construction of external representation or tacit knowledge by more knowledgeable peers; thus providing benchmarked modeling of knowledge to less competent learners.

"And if I'm not deal, I would just pop the question online. One thing I like about online is there is always someone to reply me with an answer to my question or even part of the answer". (L7)

Other than enabling sharing of existing knowledge, discussion boards (e.g., Moodle) also encourage learners to negotiate meaning to form new ideas; thus facilitating the accommodation and assimilation of new and old knowledge structures.

The act of expressing what is in the heart and mind could birth a special relationship “like my friend” (L6) between the ‘solitary’ self-directed user of the web tools and the faithful technology; consent a conduit for articulation of thoughts and emotions. The expression of true friendship among the community of learners is needed in a laborious self-directed learning journey.

Evaluation Tools

Moodle, Google docs and Wikispaces are web portfolios that the instructor used to provide ‘live’ and just-in-time feedback.

In the learners’ shared contract, individual learners were urged to reflect on their progress in relation to the learning goals they set. The learners discovered that the more they engage in their learning contract, the more there is to reflect and learn “according to our pace and experiences for the week. It was difficult at the beginning but the more I enter into the LC, I discover another world in there”. (L5) Google Docs which was used to host the
shared LC inculcated a culture of accountability and self-responsibility in learning self-directedly as feedback is regulated by the entire learning community.

Similarly, live feedback documented on Wikispaces gave the team the flexibility to discuss and revise content in situ based on composite opinion.

“We looked through all the feedback and there were things that were changed from the planning. But the change was for the better”. (L9)

As learners consider another’s point of view, they traverse through layers of understanding through multiple reflection and feedback, transforming perspectives for self-directed learning.

“Eventually I was able to make more connections here and there but I have to recognize that I need to improve on my metacognition. The good thing is that now I am more aware of one of my weaknesses so it is easy to find new approaches to make improvements in this area”. (L11)

Information Tools
Web tools were used in two ways by the learners: as consumers and contributors. As consumers, the following web tools were used as self-directed learning resources, where learners check out postings from others which are relevant to their learning needs:

“I will read the five articles on Moodle by this week” (L4)  
“watching video tutorials on youtube... and then i practiced... skills like how a video editor works how to put sounds on video or sub titles” (L8)

“when i was looking for a good and simple video editing program... was reading the comments in different blogs which have introduced different video editing softwares” (L1)

“search engines which are smarter these days... google is such a good assistant for me almost always”. (L13)

As contributors, learners create a knowledge repository for self and others in the learning community after consuming relevant information sources. For instance, learner L1 created a personal wiki on his own initiative to record synthesized understandings from reading, and which L1 re-examines as reflection throughout the semester.
Research Question 3
Self-directed learning is a developmental construct and learners faced a steep learning curve (Figure 2), transitioning through five phases of "torture" (L8) before seeing the light of victory. The voices of the learners illustrate the tensions felt in each transition phase (Table 1):

![Self-Directed Learning Curve](image)

**Figure 2:** Self-Directed Learning Curve

<table>
<thead>
<tr>
<th>Phase</th>
<th>Transitional Phases</th>
<th>Example of revealed tensions</th>
</tr>
</thead>
</table>
| 1       | Diffidence          | "I will always feel that I need some level of explicit guidance to feel that my learning experience is more enjoyable and when a teacher guide me through interactive lectures project's evaluation and in and out of class discussions I feel I can accomplish a lot more than just by myself."
| 2       | Struggle            | "I'm trying very hard to... gain something with own effort". |
| 3       | Impasse             | "When other groups was presenting their prior project, my group could only stare and listen". |
| 4       | Adaptation          | "Once I realized that metacognition is not one of my strength, I've been thinking how to make myself more connected to this model of learning". |
| 5       | Transformation      | "Sometimes, I do find it is overwhelming but in the end I think this is what I need to have to be an achiever in life". |
The phases of transition are indicative of a conflict of roles as perceived by the beliefs of the learner in the survey questionnaire, which resulted in different actions to adjust to the eSCLE.

The proposed learning environment to empower capacity and capability is seen as a 'controlled-ill-structured' environment where learners working on solving problems in authentic situations experience 'discomfort', through the five phases in SDL learning curve (Figure 2 and Table 1). Nonetheless, as learning capacity and capability is stretched, learning in the 'discomfort zone' would be remembered as 'birthing pains' which produces great joy through the discovery of self potential.

The phases of transition lead to transformation of perspective; in ownership and responsibility for learning as characterized by self-directed learners. It was discovered that the instructor has to provide psychological support so that learners could develop from someone with unconscious self-directed learning incompetence to one with unconscious self-directed learning competence, where focus would not be on knowledge or skills already known but on developing capacity and capability to learn more.

CONCLUSION

In answering the research questions above, the findings of this study conclude that the activity system designed to facilitate self-directed learning represents a complex paradigm shift from individual as agent of development to the interplay between individual, social and mediating tool as agent of developing self-directed learning (Refer to Figure 1). The division of labour between the parties introduced conflicting sentiments of uptake where learners showed ambivalence in accepting varying degrees of choice in learning (option vs obligation), in addressing tasks of ill-structured nature (certainty vs ambiguity), in adapting to learning while doing and not prior to doing (theoretical vs practical), in sharing responsibilities in a self-directed classroom (learner autonomy vs teacher control), in coping with non-preferable tasks (match vs mismatch) and in viewing self-directed learning and the learning of ID as a collaborative and developmental effort (process vs product).

However, appropriate web technology integrated into interactive environments are useful tools to facilitate self-directed learning;
Facilitating the Development of Self-Directed Learning through the Design of Learning Activities

Through learning activities involving the inquiry of information through investigation, metacognition, collaboration, production, interaction, articulation and evaluation. The actions of inquiring, reflecting, investigating, collaborating, interacting, articulating, producing and evaluating should be iterative (with embedded feedback loops) in order to engage learners in meaningful self-directed learning. Web technologies integrated in the eSCLE create and transform the learning experiences mediated by the activity system (tools and resources) into culturally acceptable attitudes, skills and knowledge. It is important that appropriate web tools are chosen as a joint effort (being determined by both instructor and learners) in empowering learner capability and capacity for self-directed learning beyond the confines of the instructional system; which when practised as continuous engagement in acquiring, applying and creating knowledge and skills in learners' unique contexts, lead to habitual self-directed learning as lifelong learning. Web tools used as combination of asynchronous and synchronous technology promote multi-modal interaction (eg: learn-content, learner-teacher, learner-learner) and have unprecedented power to scaffold self-directed learning, even within short-term formal learning situations. In any case, the integrated web tools are not a replacement of the instructors' human presence of modeling, scaffolding and coaching. The web tools simply afford an additional mediating tool, providing a dimension of 'omnipresence' that transcends the physical constraints of instruction.

Finally, self-directed learning is perceived to be a developmental skill, and developed within socio-cultural contexts featuring acclimatization requirements of real-world learning. In line with a process-oriented approach to learning, the designed eSCLE help learners transition through phases of self-directed learning (diffidence-struggle-impasse-adaptation-transformation), albeit in a steep learning curve. In facilitating growth and change of behavior related to the development of self-directed learning, it is contended that the instructor has the obligation and not prerogative to empower learner voice and choice, so that learners could seek out their preferred learning needs, to address any mismatch or deficiencies in the designed learning experience within their personalized learning environment. This is to provide for what is to be termed as 'constructive acclimatization' in the activity system, so that over time...
learners gradually learn to be self-directed in a critical rather than just technical way. Critical and technical interpretation of self-directed learning is differentiated (Smith, 2002); with the former leaning towards lifelong self-directed learning, encompassing the continuous exercise of authentic control over all learning decisions while the latter concerns the access and choice from a range of available and appropriate resources.

ACKNOWLEDGMENT

Grant Number: PS005-2011A

REFERENCES


Facilitating the Development of Self-Directed Learning through the Design


