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PERSONAL LEARNING ENVIRONMENTS ENHANCE LANGUAGE LEARNERS TO ORGANIZE SELF-REGULATED LEARNING*

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Abstract

Review of literature provides a conceptual framework of constructivism in education as well as a language pedagogy aspect based on the notion of the rhizome. This concept enables language learners to boost up decision-making power and offers them a vital opportunity for learning development. As the ubiquity of information technology, students can access online information via the Internet and various social networks. Many sources included in virtual learning platforms and social networking services are not adjusted to meet students' requirements and/or to fit into any learning styles of each student. Those students need to have an ability to acquire, analyze and evaluate [academic] information. The purpose of the study was to examine English majors' decision-making mechanism within their personal learning environments. To simplify this idea, this study intended to (1) analyze pathways of learning taken by EFL (English as a foreign language) learners as they navigate the Internet and/ or deal with other resources of academic learning; and (2) seek factors influencing the learner's decision-making processes while undertaking learning tasks. English-major learners from one university in the south of Thailand were purposively selected. An online questionnaire surveyed with 65 valid responses and a semi-structured interview was conducted later (n=10). The survey consisted of seventeen questions and was used to collect the participants' online information search strategies.

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Findings in quantitative approach reported that the participants employed five strategies relating to decision-making mechanisms. Those strategies were reading for main ideas, trial-error, problem-solving, purposeful thinking, and evaluation. Besides, four emerging themes from qualitative approach were (1) research-based activities, (2) knowledgeable persons, (3) academic mindsets, and (4) freedom to learn. The findings of this study also provide valuable insights into fostering self-organized learning and reconfirm an idea of self-organized learning environment by connectivism.

Keywords: personal learning environments, decision-making mechanisms, the rhizome approach, computational thinking, self-regulated learning

1. INTRODUCTION

In the 21st century, learners in many academic disciplines in higher education need to possess an outstanding capacity to acquire, analyze and evaluate digital information. Learners necessarily retrieve [academic] information in order to obtain better understandings of particular contexts, and shared-knowledge. Hence, learners are considered as an active information consumer rather than a passive one. With the exponential growth of digital technology, and especially the Internet, they yield valuable information for multi-disciplined learners in that technology has changed a way for the learners of creating, managing, gathering, and accessing information. Consequently, it is necessary for any learners to evaluate, organize, and design [learning] activities by themselves. Learners become self-reliant and are able to manage rich information as well as communicate with others openly and freely (e.g., Lian, A-B, 2014).

With respect to self-organizing learning, learners who could design and identify their learning task activities need to manage sequences of tasks and solve problems (tasks) by themselves. How the learners construct their learning activities depends on how they play their role--a content creator or a learning task designer. In details, learning goals have been shared between learners and a teacher. Then, the learners have to demonstrate what they gain understandings about the learning goals. That is, the learners interpreted a meaning of the real world from their understanding rather than what they see (Lian, 2008). During learners' Internet navigation, the learners could identify each reference or website visit in a timely manner in order to prove that they gain an insight into a particular context and can adjust their new knowledge into a previous experience. Whether a learner visits websites or deals with experts, each pause of visits might show an act of volition. Making-decision processes generally

exit when people face problems. As for learners, learning tasks could provide some difficulties to learners and lead them to academic problems. In this current study, hence, the participants were assigned to work individually in the course *Individual English Study*[1]. This course offers learners research-based activities. Also, it is the one of compulsory course that the learners were expected to be well equipped with language skills, problem-solving skills, research skills and decision-making skills. The time allocation of this course was 16 weeks (3 hours per week). The aim of this paper is to examine English majors' decision-making mechanism within their personal learning environments (PLEs). It leads to search for answering the following research questions:

1. How do EFL learners develop their self-organised learning pertaining to the construction of their personal learning environments (PLEs)?

2. Are there any significant factors that influence EFL learners' decision-making processes as they navigate the Internet or approach other resources for learning as they construct their personal learning environments? What are these factors?

Personal Learning Environments (PLEs)

Personal learning environments (PLEs) are considered as a personal space of learning organization. Unlike a graphic organizer, or any of artistic works, the PLEs look like a mind map of an individual containing a-process-like with multiple entryways or with ceaseless endings. In other words, the PLEs are reversible in terms of contents, communities, and particular interests. The PLE generally becomes a space for learners to accumulate information and share feedback. To cite some large-scale and high quality studies, Pineda (2014) asserted that the PLE can be created by exploiting eclectic web-based tools, negotiating with social network services, and/ or dealing with knowledgeable persons. Hence, the PLE is considered as "a comfort zone" of learning where learners can aggregate digital data from the Internet and directly connect them to different sources of their learning preferences. Likewise, Archee (2012), suggested that the PLEs are similar to "a digital space" where provides individualized support tools for making each learner's thought visible and apparent to others. Summarizing the views of Archee (2012), Dabbagh and Kitsantas (2011), Lian and Pineda (2014) and others, the PLEs promote self-regulated learning as the PLEs serve as both formal and non-formal education. With respect to formal education, instructors or institutions could provide a space

[1] Course description (1554906): This course introduces information on basis research skills and provides the opportunity into practice in individual work (Registration Department, Songkhla Rajabhat University, 2016)

for observing interactions, linking across [academic] sources and providing feedback. On the contrary, the PLEs for non-formal education allow learners to access digital sources through the Internet in anytime and at anywhere, and to store any information fits their preferences as well as learning requirements. The PLEs represent the structure of knowledge building. Each learning pathway could indicate a learner's good endeavor to contextualize of what s/he has obtained. Therefore, the PLE is an assemblage. A varied assemblage of lines seems to be a precursor of learners' preferences.

Theoretical Framework: Multiplicity and Chaos as the Rhizomatic Approach

The term '*rhizome*', a botanical term coined by Deleuze and Guattari (1980), is best described itself as the relations and connectivity of things ("Rhizome- Deleuze & Guattari – IAAC Blog", 2017). With respect to a personal learning environment, a rhizome forms assemblages--including groups of people, various sources of academy, network services and so on. In this view, a rhizomatic perspective exclusively reveals how knowledge can be constructed within an individual. S/he can create and construct her/his knowledge by negotiation with different social communities as well as collaborative work with other knowledgeable people. The growth of the individual's knowledge might depend upon her/his background experience. It has been accumulated by acquiring and learning, as well as particular interests upon learning contents. In a space of not knowing and being known, the individual tends to be back away from her/his preferences for an action. Failures in terms of processes, time allocation, and academic resources can exist and cause the individual to come up with and organize an idea to render required information. Each individual requires a large amount of resources, feedback, and concepts to be brought to facilitate her/his to search for a [academic] solution. Every act of volition is chaotic.

Constructivism in Education

The general sense of constructivism is a theory of learning and how people interpret a meaning of the real world (Richardson, 2003). An individual creates a meaning when s/he gains an insight into what s/he has experienced and what s/he already knew. Thus, the central premise is that the individual is expected to construct her/his knowledge as an internal representation (Yoder, 2014) from a previous knowledge and social interaction. Hence, critical keys relating to constructivism are prevailed: cognitive language learners, feedback provision, self-reflection, and prior knowledge (Brook & Brook, 1999). Within educational contexts of constructivism, Piaget's (1936) theory of cognitive development has much to contribute

towards other perspectives of individual development (Jones & Brader-Araje, 2002; Naylor & Keogh, 1999). For Piaget, knowledge can be constructed when it was passed through a process of adaptation of an individual who is ready to learn. By contrast, social constructivism outlined by Vygotsky (1978) focuses on social interaction. His one of key terms is the zone of proximal development (ZPD). The ZPD is applicable to develop many disciplines; foreign language pedagogy (e.g., Ohta, 2005; Rezaee & Azizi, 2012); mathematics (e.g., Steel, 1999); applied sciences (e.g., Murray & Arroyo, 2002), as it illustrates a process of gaining knowledge through interaction with people [peers, instructors, experts] within a particular community. According to the ZPD description, ZPD is "*the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers* (p.86)" (Vygotski & Cole, 1981). To interpret this idea, knowledge can be constructed when an individual is ready to make a meaning with helps from knowledgeable people. Constructivism in class will be effective and efficient when learners are active enough and when learners are evoked by shared-learning goals.

In applying the key concepts of constructivism to this study, a learner's learning environment mapping represents how s/he interprets a meaning of obtained information while navigating the Internet and/ or traversing through a path of learning. Learners demonstrate a process of deriving meanings by negotiating with people (i.e., group discussion, social interaction) as well as by social network services. Complexity with different sources of information retrieval might symbolize an act of volition within an individual while navigating the Internet. Learning begins when an individual interacts with communities (Cormier, 2012). To clarify this idea, the figure below (Figure 1.) is about a hypothetical rhizomatic PLE of an individual's project and project presentation.

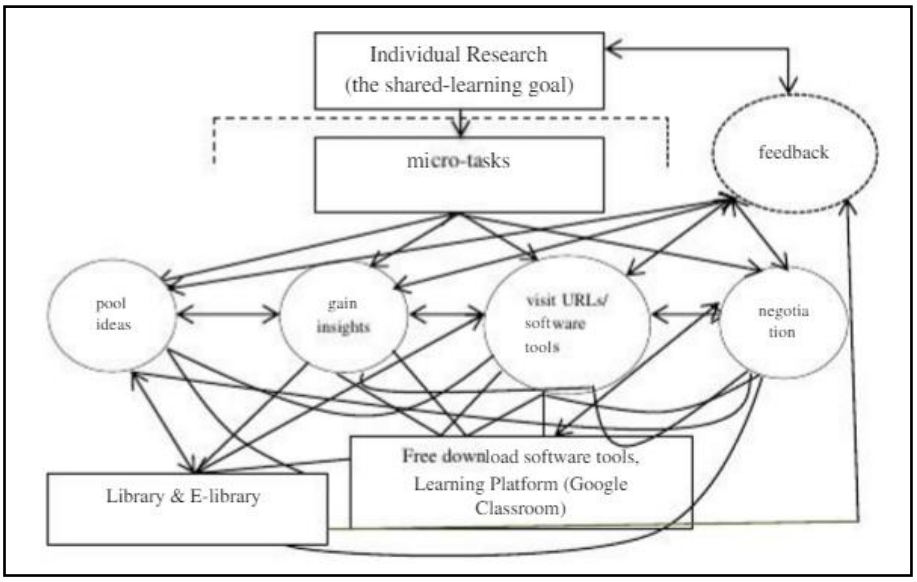

Figure 1A hypothetical rhizomatic PLE of an individual project and project presentation

In order to complete micro-tasks, the learners need to approach several fragments of knowledge resources such as library and software applications. These resources lead the learners to pool ideas, gain insights into novel understandings, evaluate online information retrieval, and deal with [ideally more] knowledgeable people [experts]. Additionally, feedback is essentially important to all learners and instructor as feedback could lead them to meet a shared-learning goal. Consequently, a learner could demonstrate a better understanding of what is to change and express logical reasons.

Thinking approaches to self-organized learning systems

Regarding the term 'multiplicity' by Deleuze and Guattari (1987), it represents numerous directions of self-determination and self-discovery of one learner. That is, the learner needs to engage with different degrees of information and deals with complexities of every context in her/his daily life. In doing so, the learner demonstrates to negotiate other people in different communities and make a connection to retrieve [rich] information. Arguably, an action of learning might be similar to each other. Nevertheless, a meaning making of one learner is different from other counterparts. That is, a way to establish solutions depends on how the learner organize to solve the problem (meaning interpretation).

A possible way of dealing with problem-solving in learning is computational thinking (CT), a means for conceptualizing contexts of learning and designing learning systems. That is, it is likely to be computing concept-driven approach to solve a problem (Wing, 2006). It works like what computers solve problems. Four keys for CT consist of (1) *decomposition* dealing

with breaking a problem into possible and manageable solutions, (2) *pattern recognition* pertaining to gaining an understanding of one topic and initiate a series of details of that topic, (3) *abstraction* dealing with pattern generation, and (4) *algorithm design* pertaining to realize and generalize problem-solving procedure to a variety of problems. This idea could be applicable to other fields of study such as tourism management, language development, and so on.

2. METHOD

This current study focuses on sequential mixed methods in order to collect English learners' online search strategies and find out how they demonstrate decision-making processes during navigating online information retrieval. Data was collected from the questionnaire, the semi-structured interview, students' written diaries, and learning mapping. The quantitative analysis provided a descriptive statistic of learners' online search strategies and favorite search websites whereas qualitative analysis emphasis factors influencing learners' decision-making processes during navigating the Internet and/or dealing with personal resources.

2.1 Participants

The research participants (N=65), 34 males and 31 females, included English majors from the southern university of the Faculty of Humanities and Social Sciences. A majority of participants (n=42, 64.6%) spent 1-3 hours, some (n=14, 21.5%) around 4-6 hours, and the rest of them (n=9, 13.9%) spent more than 6 hours weekly for online information retrieval, respectively. Almost all of them reported that they gained knowledge of using the Internet before studying at a higher education. Of the students who participated in this study, they were required to enrolled in *Individual English Studies*. This course is a compulsory course for 4^{th} year English majors.

2.2 Data gathering

This study involved 65 full-time students who enrolled *Individual English Studies*. The characteristic of this course was fostering an understanding of basic research skills in English studies and those students were expected to conduct his/her study individually. With a pre-determine syndicate of gathering research data, the researcher distributed a consent form of research participation together with the online survey to the participants by posting on the group of participants on the Facebook wall (a closed-group). Initially, the researcher had informal discussion with the course adviser about the researcher's study objectives and time allocation of data collection. Then, three phases of data collections were:

***Phase I* Collecting data from a questionnaire (OISSI)**

The contents of a questionnaire were adapted from Tsai's (2009) online information search strategies invention (OISSI) framework covering three domains: behavioral, procedural, and metacognitive. The domains encompassed seven aspects of online information search strategies; control, disorientation, trial and error, problem solving, purposeful thinking, select main idea, and evaluation. The behavioral domain covers control and disorientation aspect strategies; the procedural one involves trial and error and problem solving aspect strategies; and the metacognitive domain includes purposeful thinking, select main idea, and evaluation. The decision to exploit this questionnaire as one of research tools is that many questions of the survey embrace an area of decision-making mechanism such as trial-error, problem solving, purposeful thinking, and evaluation. In respect of reliability and validity of the questionnaire, the 17-item test was evaluated by five experts with the index of the item-objectives congruence (IOC) forms. It was found that the questionnaire (adapted version) with the IOC analysis were deemed acceptable. The reliability of items in the questionnaire appeared to have internal consistency, (α= 0.90). Nevertheless, four perspectives dealing with decision-making were trial & error, problem solving, purposeful thinking, and evaluation. The total number of the items were seventeen.

The questionnaire was administered twice as a pretest and the posttest. The mean scores of both the pretest and the posttest were statistically compared to examine whether or not the participants performed their capacity of the Internet navigation.

Phase II Students' Written diaries

Written diaries were collected from the participants. Approximately, ten of them frequently responded the question and kept expressing their attitude towards learning activities through the semester. Then, they were also invited to interview. Data from the diaries were recorded by using qualitative data analysis (QDA) software. The data, then were transcribed verbatim for each subject. Subsequently, three raters were invited to help scrutinize transcription. Significant statements were identified and meanings were formulated from them. The meanings were arrived by prolonging raw data.

Phase III Semi-structured interview protocol

A semi-structured interview was conducted with ten informants. They were invited and selected based on their written diaries and the acts of the Internet navigation. The semi-structured interview protocols were constructed to explore a wide range of views and provide a comprehensive portrait of responses to online information search, and of how English majors made a decision during retrieving online information. With respect to reliability and validity,

twelve semi-structured interview protocols were analyzed by using the IOC analysis. It was found that all questions were relevant to the objectives of the current study. Time allocation for each interview was approximately 30-45 minutes. Prior to use a set of the semi-structured interview questions, all informants were responded to the guiding questions such as (1) how do you search a topic for your individual project?, (2) How do you access information through academic databases?, and (3) Who introduce you to using the databases? All information collected from this section was analyzed by thematic analysis (Braun & Clark, 2006). As a result, learners' mind maps were drawn by the researcher during the semi-structured interview. At that time, the notion of the PLE was a new experience for the participants. Actions of navigating the Internet were recorded by using a screen capture software. Hence, all clips were downloaded into the researcher's YouTube channel which was set in a privacy mode. The maps, then, were created by using a mind map software generator. After that, the maps were sent and double-checked by the informants. To clarify the picture of the learner's mind map, the following figure (Figure 2) is one of learners' mind maps.

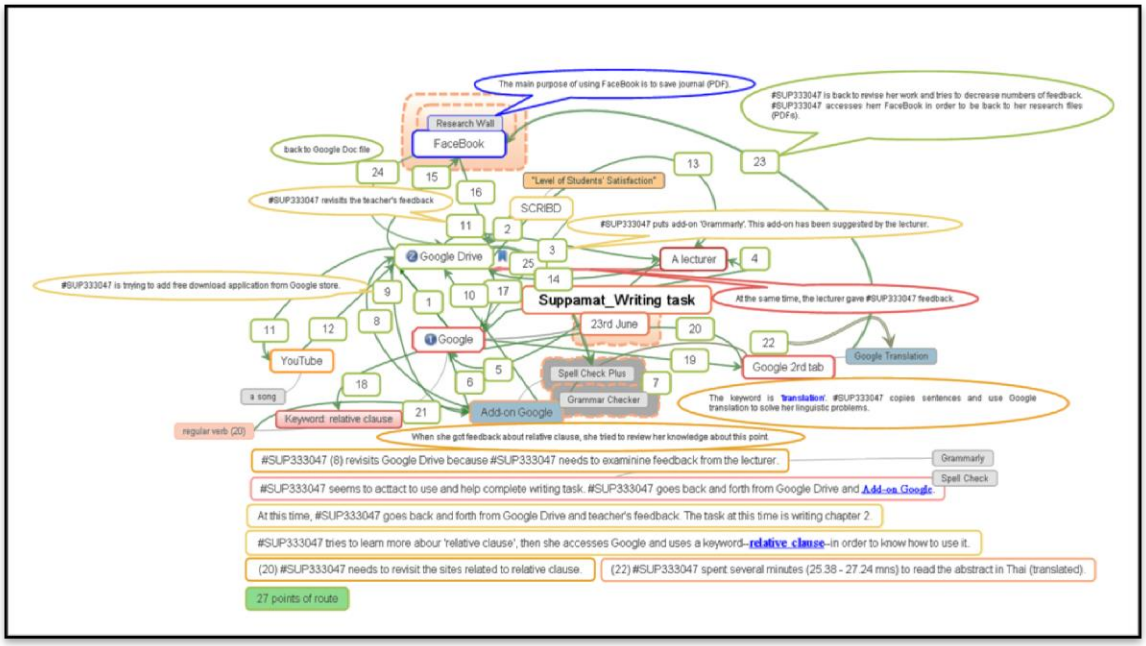

Figure 2 An example of a learner's mind map (PLE)

2.3 Data analysis

This current study employed both quantitative and qualitative methods to conducted a content analysis of the data. As Maxwell (as cited in Teddllie & Tashakkori, 2009) noted that a mixed-methods approach was applicable to increase validity. The qualitative approach is probably workable to explain complex phenomena while the quantitative approach was used to keep records of testing scores. This study also focuses on making prediction of learners' behavior in decision-making. Hence, integration into qualitative and quantitative data involved transforming survey (closed-ended questions) results into interview as well as students' written diaries (open-ended) result on a study or vice versa. Consequently, data interpretation sections revealed mixing stages of the research procedure.

Using mixed-methods, participants responded the survey. Under Tsai's (2009) framework, the adapted version of online information search strategy inventory (OISSI) was used to examine learner's search strategies. Each item of the OISSI was measured by the five-point scale ranging from 'not at all like for me' to 'very much like me'. Scale description was adopted from Tsai's (2009) OISSI. Of the first part of the questionnaire, demographic information were investigated (the information was previously elaborated in section 2.1). Of the second part of the questionnaire, responses were coded into two categories, 'like me' and 'not like me'. The critical aspects relating to decision-making include four categories namely, trial and error, problem solving, purposeful thinking, and evaluation. The reliability alpha (α) was .85, .41, .79, and .83 respectively.

The convention approach of thematic analysis is generally to identify themes and/ or patterns of the phenomena (Braun & Clark, 2006). This study also used the themes to identify themes of learning resources that a majority of participants (language learners) frequently access. The themes might preliminary identify participants' preferences and requirements in achieving learning goals.

3. Findings

3.1 Research question 1: How do the EFL learners develop their technological skills to organize their learning?

The findings revealed that the online search strategies were necessarily important to the learners at present. The following table (Table 1) is the average scores of the pretest and the posttest (Tsai, 2009).

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Table 1: The average scores of both the pretest and the posttest (n = 65)

Category	Item	$\overline{x}$ pretest	$\overline{x}$ posttest
Trial & Error	1. I try some possible entrance websites when I cannot find enough information.	3.70	3.68
	2. I try other databases when I cannot get any enough information in one database.	3.77	3.65
	3. I try some other search engines when my search is not successful.	3.64	3.67
Select Main Idea	4. I usually think about what keywords I can use in advance.	3.49	3.86
	5. I select main ideas provided on each webpage as possible as I can.	3.71	3.77
	6. I look through titles or hyperlinks in a web in order to find each major information.	3.35	3.58
Evaluation	7. I think of how to present and organize the data that I have obtained from the website.	3.38	3.55
	8. I keep on evaluating the relationship amongst the information searched from the website.	3.26	3.49
	9. I compare information that has been gathered and collected from different websites.	3.74	3.93
	10. I design if the information provided in a website is notable for reference.	3.88	4.01
Purposeful thinking	11. I usually understand the goals of information retrieval before starting my online searching.	3.64	3.97
	12. I keep on reminding myself of the purposes for searching online.	3.75	4.09
	13. I think of how to utilize the searched information.	3.42	3.80

Category	Item	$\overline{x}$ pretest	$\overline{x}$ posttest
Problem Solving	14. Sometimes, I pause to think about what information is still lack.	3.55	3.75
	15. I usually give up searching when I come up with unsolved problem.	2.96*	3.14
	16. I think of some resolutions when I am frustrated with searching problems.	3.46	3.52
	17. I do my best to resolve any problem occurred during a searching.	4.06	4.07

(adapted from Tsai, 2009)

According to the above table (Table 1), the average scores of the pretest and the posttest were not much different. A majority of the participants seems to be equipped with online information retrieval as well as is able to develop decision-making skills. Notably, the item number 15 (Problem Solving) showed a bit high difference. Within three items of the problem solving aspect, a vast number of the participants positively responded. The participants could gain an understanding how to solve problems (see also the mean scores in the two items number 16 and 17) as well as intend to make a firm decision to do. Arguably, an action of pausing happens because they might try to search for a possible way to solve problems.

3.2 Research question 2: Are there any significant factors that influence EFL learners' decision-making processes as they navigate the Internet or approach other resources for learning as they construct their personal learning environments? What are these factors?

According to the first research question, online search strategies are one of important factors influencing the learners' decision-making processes. Other factors are drawn from qualitative data analysis (textual and visual data). As for the textual data, the 10 respondents were invited in order to interview.

Moreover, four themes from the thematic analysis (Braun & Clark, 2006) revealed that (1) learning with research-based activities could help the learners design their own learning requirements that were relevant to a shared-learning goal. In other words, research-based activities effectively influence the participants to get work done. (2) Comments and feedback from knowledgeable persons are helpful and useful. (3) Academic mindsets could guide a learner to achieve a shared-learning goal. And, (4) freedom to learn empowers any

learner with the ability to study, trigger ideas and increase the chance of initiating their own learning processes. The following table (Table 2) provides corroboration of the themes.

Table 2: Corroboration of the themes

Theme 1 **Theme: research-based activities**	**Theme 2** **Theme: knowledgeable person**	**Theme 3** **Theme: academic mindsets**	**Theme 4** **Theme: freedom to learn**
Subtheme: Online and networking services are helpful. *"When I made this presentation I accesses Facebook at the beginning of my working time. Then, I visited YouTube in order to watch some clips related to my work. I sometimes applied some techniques to my presentation".#333051* *"I love Facebook and Google. These two provided me lots of information". #333066* *"My mission was to keep working on reviewing literature. I adjusted my keywords for searching further information. In the meantime, I visited the citation link at cite-this-for-me ...". #302051.* *"I decided to use any*	Subtheme: feedback from teachers *"I read my comments taken from my teacher. If I cannot get it I will send a message to her". #333051* *"I usually get comments from my teacher and I request a meeting with her in order to talk to her". #302061* *"At first, I had got an idea but needed to discuss the points with my friends. We used a live chat box to talk with each other". #302027* *"My teacher introduced me to use the cloud Drive to work" #333049.* "I could apply some techniques from other suggestions via	Subtheme: hope to get work done "I spent much time to work but it was valuable to complete the assignments". #302055 "I could apply some techniques from other suggestions via the chat. It worked". #302027 "I shared my files with my project partners via Facebook and invited him to work on Google slide". #302037	Subtheme: technology helps to widen view *"I love Facebook and Google. These two provided me lots of information". #333066* *"When I made this presentation I accesses Facebook at the beginning of my working time. Then, I visited YouTube in order to watch some clips related to my work. I sometimes applied some techniques to my presentation".#333051* *"I decided to use any software on the Cloud drive because it provided choices for me completing my work" #333047.* "I shared my work with my friends and teacher because it saved time to revise my work. Specifically, I

Theme 1 Theme: research-based activities	Theme 2 Theme: knowledgeable person	Theme 3 Theme: academic mindsets	Theme 4 Theme: freedom to learn
software on the Cloud drive because it provided choices for me completing my work" #333047. "I shared my files with my project partners via Facebook and invited him to work on Google slide". #302037	the chat. It worked". #302027 "I shared my files with my project partners via Facebook and invited him to work on Google slide". #302037		saved time when my teacher gave feedback I could correct them immediately". #333009.

The conclusion was developed from the above data. The core findings are from four themes. Extracting these themes, a few critical aspects in self-managing learning are presented as follows: technological strategies, negotiation, self-regulation, self-efficacy, and self-managed.

4. Discussion and Recommendation

4.1 Discussion

This study sought to understand how language learners organize their learning as well as investigate significant factors influencing their decision-making procedure as they navigating the Internet. The findings of this study revealed that technological strategies are essentially necessary for learners in a ubiquitous society. The participants also reported that critical factors to get work done are aligned with the hypothetical rhizomatic PLE presented previously. Although each PLE of the participants seemed different in terms of preferences, self-requirement, and learning goals, a PLE could consist of online strategies, rich information negotiation, as well as human and non-human resources. That is, an individual gets different pathways of learning due mainly to several factors. From the bottom-up, an active support from schools, or any institutions provides learners existing infrastructure (i.e., database) and the teachers give both synchronous and asynchronous feedback to learners. A role of the institution and a teacher has been changed. On the other hands, learners accumulated experience as well as collected assemblage of information from either non-human or human

resources. In sum, a whole picture of an individual's PLE is definitely irrelevant from '*one size fits all*' belief. By contrast, it totally supports self-organized learning environment (SOLE) (Mitra, 2014).

With respect to research-based activities, the participants were required to produce a research proposal that were an outcome of a course. They were allowed to use any technology to help them achieve learning tasks. The significant statements show that a majority of informants experienced satisfaction of using [free download] software applications such as Grammar checking, Google translation. Education as actualized in *Individual English Studies*, in-class activities were devoted to creative thoughts while outside class activities fostered the learners in designing their own learning environments. They also reported that they could gain insights into novel knowledge. That is, research-based activities encourage the learners to manage and develop their views. The findings also showed that self-organized learning and computer-mediated learning are successfully developed in a teacher-free situation (Bussakorn, Praweenya, & Anuchai, 2017; Mitra, 2012, 2015).

One critical point of the findings—*freedom to learn,* also shows that computer-mediated and making use of technology are really important to promote active learners in this century. Freedom in learning empowers any learners with an ability to study, trigger ideas and increase a chance of initiating their own learning processes (Wipapan & Wipada, 2018). In short, the learners were motivated by the alternatives that they construct by themselves.

In conclusion, an idea behind PLE creation is likely positive as an individual (any learner) feel free to collect rich information in order to fill her/his gaps and/ or search for possible solutions to solve particular [academic] problems. Consequently, the learner could develop a dedicated learning environment in order to fix academic difficulties and improve specific knowledge.

4.2 Recommendation

The results of this study lead to recommendation for further studies as follows:

1. This study was a first attempt to trace EFL learners' behavior in the Internet navigation across personal learning environments in one course at a tertiary level. A large-scale replication is essentially needed.

2. The participants were fourth-year full-time learners. It is advisable that a framework should focus on the learning system of a multidisciplinary group of graduate students.

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