

Experience of Using Laptop in Higher Education Institutions: Effects *with* and *of* Ubiquitous Computing under Natural Conditions

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Abstract

This study provides an in-depth description of adult learners' perceptions and experiences using laptop computers in higher education institutions. The study also examines the influence on human beings' cognitive activity by using laptops. The results are organized into seven themes and four classifications: usage, benefits, limitations, and cognitive impacts.

Introduction

Portability characteristic, wireless connection, and sophisticated functions of laptop computers provide users more mobility and freedom of choice. Using laptop computers is leading to a new kind of learning format. Educators employ the term "M-learning" to emphasize cognitive, pedagogical, and social aspects of mobile technology-using for educational possibilities. Many schools and corporations such as Microsoft, Toshiba, Apple, Netschools, etc., have set up projects to promote the use of laptop computers for educational use. Laptop computers, along with other portable technology, have become tokens of a new learning format.

While technological advances have made "anytime, anywhere" learning feasible, few studies have been conducted to examine in-depth views of the learners who are using laptop computers. If we adopt Vygotsky's (1978) socio-historical perspective that using new tools gives rise to new social structures and mental structures, we can further conclude that learning and cognition, which are based on mental structures and are reflection of social existence, will also change correspondingly. Therefore, it would be valuable to study such changes in mobile learners during the transitional period from e-learning to m-learning.

Research Questions

The purpose of this study is to examine the experiences of adult users who use laptop computers to support their daily learning activities in higher education institutions. Researchers are interested in knowing how laptop computers serve as mobile learning tools. Researchers attempt to provide an in-depth description of learners' perspective and experiences about integrating these mobile devices into educational use.

Four specific questions are: How have laptops been used in academic activities? What benefits do learners get by using laptops? How laptop computers change learners' cognitive activities? What problems exist during using laptops for educational use? The results from the study may provide implications for more effective technology services and mobile learning pedagogy, design, and development.

Literature Review

Sophisticated laptop and wireless technology, as alternatives of desktop and wired technology respectively, have gained much importance in the recent years. Inspired by the improvements in portable computing technology and examples of successful pilot programs, more and more schools and corporations have initiated projects to promote use of laptop computers (Belanger, 2002). Laptop computers, just like desktops, integrate not only productivity tools, such as Word, Excel, Access, and PowerPoint, but also audio and video functions. With a microphone, video camera, and the Internet, a laptop can be used as a voice talking tool and a video communication tool. Other application software also enhances functions of a laptop. Instant messaging, like MSN, Yahoo Messenger, and ICQ, has a value of presence detection and has become a very popular tool for text, voice, and video communications in both one-to-one and group formats (Wainhouse Research. & First Virtual Communications, Inc., 2002). Other applications that may facilitate learning activities and interactions, such as file transfer, stream media, whiteboard, desktop sharing, and tele-control, can also be easily installed on a laptop computer. The trend of wireless connection further fosters the growth of "ubiquitous computing" on campus (Molenda & Sullivan, 2002). With wireless connected and sophisticated laptops, digital being and physical being are merged together. Ubiquitous computing provides new educational

possibilities. Mobile learning is one such term to describe a learning format via portable technology (especially a laptop) and wireless connection in the context of ubiquitous computing.

While technological advances have made mobile learning and teaching feasible, cognitive, pedagogical and social level challenges have emerged. Compared to other research in the field of instructional technology, few of solid research studies have been done in terms of mobile learning. Articles related to laptop-using appear more online than in journals and most of them are of the nature of evaluation projects. Through these limited research studies, we can still learn the usage, benefits, and barriers regarding laptop computer-using, which would provide us a historical perspective and assist us in attacking research questions for this study. One of the most high-profile initiatives is Microsoft's Anytime Anywhere Learning Program, which was published as the Rockman Report (Belanger, 2002). In their study, Rockman et al. (1998) reported significant learning and accomplishments in skill development, applications of technology for schoolwork, and improved critical thinking by using laptop computers. Rockman et al. (2000) compared two groups of laptop-using schools and non-laptop-using schools. The findings indicate that laptop-using students have more technology literacy and skills, better performance on writing assessment, and more positive attitude toward computers. There are also many other research studies on the effect of students' achievement by using laptops (Gardner et al., 1994; Stevenson, 1998; Siegle & Foster, 2001). Gardner et al. (1994) got mixed findings that laptop-using had a positive effect on science achievement while no effect on achievement for mathematics and English. Gardner et al. also report that students with laptop computers are more motivated and are quicker to gain technology literacy. Stevenson (1998) did an evaluation with focus on a standardized achievement test. The findings included that laptop participants significantly outscored their non-participating peers on test and laptop participants have better school attendance. Siegle and Foster (2001) investigated the effect of the using of laptop by high school students in an anatomy and physiology course. Two groups were compared by using a quasi-experimental method. The findings show that the experimental group benefited from full-time access to laptop computers, has overall higher achievement and increased understanding about the subject matter. Siegle and Foster also indicated that laptop computers can bridge the gap of the access to technology both at school and at home, and therefore increase opportunities to use technology as an authentic integral part of learning. Still other studies (Carey & Sale, 1997; Hardy, 1999; Healey, 1999) discussed laptop using in terms of a larger social context, such as equity issues, and educational paradigm change. Carey and Sale (1997) reported the benefits of using laptops for students with severe disability in cognitive development. Hardy (1999) discussed issues of equity of using laptops in school. Healey (1999) stated that laptop using would benefit student-centered learning and facilitate constructivism paradigm.

From the studies discussed above, we can see that most studies of using laptop computers using focus on formal school situations. Usually laptop computers are provided by schools, corporations, or agencies, rather than by students themselves. The use of laptop computers usually link to specific subjects. These subjects include English, writing, science, mathematics, geography, social studies, etc. Some benefits have been recognized in those studies:

- (1) Improvement in students' abilities to communicate persuasively, to organize ideas effectively, and to use vocabulary effectively (McMillan & Honey, 1993).

- (2) Laptop using improves students' technology literacy, and enhances students' motivation and independence (Gardner, Morrison, Jarman, Reilly, & McNally, 1994).

- (3) Benefit for students with disabilities (Carey & Sale, 1997).

- (4) Improves students' writing skills and fosters collaboration; allows students to work at their own pace and get more involved in schoolwork (Rockman et al., 1998; Rockman et al., 2000).

- (5) Integrates visual presentation with written notes and acquiring information with processing information; bridges school and home (Siegle & Foster, 2001).

As mentioned above, most studies center on formal learning situations, while few studies focus on informal learning environments. Then, why is an informal situation important? The reason is that the situation of laptop using has changed. Distributing computers by schools or agencies limits the sense of ownership, even if the students are allowed to take the laptops home. Just as Siegle and Foster (2001) report that students were concerned about damaging the computers, laptops in those studies are still not fully accessible and exploitable. With a limited use, a laptop is just like a desktop, not movable. Learner experience is still not totally that of movable learning. In recent years, with decrease in cost, a laptop has become a personal tool. Nowadays, we can see quite a few of learners bring their own laptops to classrooms, libraries, or conferences. Different from laptop studies mentioned above in which schools or corporations distribute laptop computers to learners, learners have a total ownership of laptops. Total ownership makes difference. Laptop computers will not be used as an experimental variable in instruction. No teacher present, no curriculum requirement, and no

explicitly measurable objectives. Learners use their laptops spontaneously for their learning. Just like most media research focuses on formal situations, research regarding laptop using also falls into this same case. Research on the role of laptops in the informal learning environment is needed. As Salomon et al. (1991) pointed out cognitive effects of technology using are reciprocally interrelated with culturally prescribed functions and modes of activities, and to detect technology under natural conditions may reveal us what happens otherwise we will not detect under experimental context. Thus there is a gap in the literature of mobile learners' experience with laptops in an informal situation or in other words, natural conditions. This study aims to fill such a gap with the focus on mobile learners in higher education at the graduate level.

Research Design and Methodology

This study is a qualitative study primarily consisting of interviews as its major methods. Three semi-structured interviews were conducted to obtain the perspectives of adult learners in higher education institutions who were using laptop computers. Each interview was conducted individually, face-to-face, and audio-taped.

Context and Participants

This study takes place in a large research-oriented university. Some buildings and facilities in the university have begun to provide wireless connections for more than one year, which are free to public. Due to low cost and easiness to build WiFi (Wireless Fidelity) network, more and more wireless access zone are being built around the downtown next to the university, such as in coffee shops, McDonalds, and other entertainment areas. "Going mobile" is becoming a hot topic for technology pioneers and fans in the university.

Three male participants, David, in his 20s, Gary, in his 40s, and Sawn, in his 30s, are all currently working on their PhD programs in the college of education in the university. They all meet participant selection criteria that a participant must use his or her own laptop along with wireless connection for more than half-year. Meanwhile, they all value and enjoy their experience of using laptop for their study, work and research.

David is a fourth year doctoral student and teaches several web design and development courses for assistantship in his department. He didn't like laptop very much until he bought one two years ago. Now he is very exciting about using laptop, especially wireless connection. He enjoys doing academic working in the coffee shop and see there as his office, since he does not have working space at home any more with the birth of his second child. He believes that laptop gives him much convenience and saves him lots of time. He is concerned that the screen size of the laptop is still too small for him to do graphic design work.

Sawn is a first year doctoral student, a previous second language teacher, and has owned a laptop for more than five years. His initial thought to buy a laptop was to learn some computer applications, like Photoshop or Excel. However, in fact, he just didn't learn them but uses laptop mostly for writing, literature searching, and doing presentation. He loves to use laptop for writing because he believes that the laptop computer produces better documents than handwriting does. Although he uses laptop very frequently, he remains skeptical of some new things on the Internet, like Instant Messaging, Blog, online chatting. He almost never uses laptop in the public area, except in classrooms. In addition, he still wants to keep formally sitting on a chair and the laptop on the desk. He thinks he grew up very traditionally and he still likes to use laptop traditionally.

Gary is a second year doctoral student and a lifelong Georgia resident. He loves technologies and is always ready for new things. He has owned two laptops since 1998. He loves to learn and never feels trouble being motivated to learn new things. He is happy that the laptop provides him a third office so that he does not need to copy files between his home office and school office. However, he agrees that it's a big challenge to get back to work when the Internet always take him away from his original work.

In sum, researchers attempt to focus on people who are actively involved in the laptop along with wireless connection in higher education institutions. In this paper, we call them mobile learner.

Data collection process

Semi-structured interviews were conducted to obtain the perspectives of mobiler learners in higher education institutions. The interview protocol (see Appendix), which focused on the experiences of mobile learners and the potential impacts on cognitive activity by using laptop computers, was used to guide the whole interview process.

Researchers identified three participants through daily observation in the college of education. The criteria to choose a participant are that the learner must be a graduate level student and must own a laptop and wireless connection for more than half-year. Interview sites were in the building where the

college of education located. Two interviews took place in the interviewee's office, and one interview took place in a lounge room of the researcher's department.

Researchers conducted three interviews during the work day of the mid-spring semester, 2004. Each participant was expected to have an one-hour face-to-face interview, which would be audiotaped. However, actually, Sawn's interview last longer than one-hour, and Gary's interview last only about thirty-five minutes because he had another appointment right after the interview. The consent form was distributed to the participants before the interview started. The participants were asked to read and signed up the consent forms. All interviews went along very well than researchers expected; all participants seemed very active to express their feelings and perspectives about laptops and mobile learning. It was the limitation of the record tape or time (in the case of Gary) that stopped the conversation. In the case of Sawn, when the interview was over, he continued to show some of his real work on the laptop. He demonstrated how to create a writing project by manipulating his previous works on the laptop. So besides the interview data, I also collected this kind of additional observation data.

Data analysis

Audiotapes collected during interviews were all transcribed. During the process of transcribing, I already began to write my initial thoughts and reflections on a separate document. I also highlighted some typical sentences and keywords on the transcripts during transcribing. After all transcribing tasks are done, the transcripts then be coded by low-level labels for index, and typical sentences and keywords on the transcripts are highlighted. After that, the codes were integrated for each participant according to the research questions, and then were input into a two-dimension table. One dimension is the three participants and another is the four major questions: usage, benefits, limitations, and cognitive impacts. So, that is 3*4 table as an approach to reduce data and seek meaning. Typical sentences and keywords were also put into each related cells. The two-dimension table provides a basis for comparison among cells. Sometime, I adjusted sentences in the cells and sometime went back to the original transcripts again for double check. At the same time, I began to formalize the themes when manipulating the table. I initially developed fourteen themes. I went back to the transcripts and questions again to check the themes and make revision. For some themes, especially on cognitive effects, I went back to check related literatures and then made revision on the themes.

In addition, during the period of data analysis, I talked informally to other people who were using laptop. I talked about my findings and asked their perspectives on using laptop in higher education institutions. I also attended a mobile learning presentation and talked with people who were showing their mobile learning projects. These conversations in fact also helped me analyze data and refine themes.

Research Findings

During the research process, we realized some functions participants experienced and described are not necessary confined to a laptop. The functions like cut and paste, or file system, or the Internet access are also integrated in a desktop computer. However, a laptop makes such functions more personally intimate to mobile learners, which help form a more intimate relationship of "intellectual partner" (Salomon et al., 1991), therefore, learners' experience with those functions are aggravated in a laptop situation.

Theme 1: Laptop serves as a "Mobile Office" and provides possibilities of "Anywhere, Anytime Working".

Participants all enjoy freedom, mobility, and portability coming with laptops and wireless connections. One biggest advantage of owning a laptop over a desktop is that a laptop serves as a bridge connecting home and office. Gary described the experience before and after owning a laptop,

"I have continuously a problem with something I need while I am here in school is not here, it is in my home office. But something I need where I am working in my home office is not with me because I left it in my school office. So the laptop builds a bridge between those two."

"Having laptop give me the flexibility to work at my office, keep my work take home conveniently work at home and come back again. So, it is much more efficient arrangement for me to have one laptop which is, in a way the laptop is my third office, or it's my primary office maybe."

Moreover, the locations of using laptop are already beyond office and home. Such locations cover library, classroom, conference site, and some public areas, like beaches. With a laptop, adult learners can move among different locations freely. David described such freedom and convenience.

"Having everything with me, I think, no matter where I am, I can work on the couch. I could be in my office. I could go to coffee shops. Wherever I am, my whole office is with me. I have all my emails. I have all my notes that I have written. I have all my papers that have been written in the past. I have all the website that I work on. Everything is there."

Meanwhile, the portability of a laptop also has a benefit of accommodating users' different preferences. Sawn is glad that, with a laptop, he can enjoy working at home now.

"I am not dependent on the computer lab being open. I'm not dependent on facilities being open."

Interestingly, participants see a laptop more as a working tool than a learning tool. Their major motivation to purchase a laptop was to have something to work on. Correspondingly, they describe their experiences of using laptop more as "Anytime, Anywhere working" than "Anywhere, Anytime Learning". When asked, "how do you use laptop as a learning tool?" Gray showed a perplex about how to link laptop to learning tool, and said

"I use my laptop primarily as a productivity tool. It does help me to generate the products related learning, like writing papers and creating web projects."

"I think it is more as of a thinking tool, that whatever kind of task maybe involved in there's always some way that a laptop can assist in."

Main tasks performed on laptops include literature locating, paper writing, research, teaching, information access, and communications. Maybe because they are graduate-level students, participants seldom use laptop for online chatting or some entertainment activities. This may be a same reason why the participants would like to describe the experience of using laptop in terms of working. The participants are adult learners at a graduate level. They usually have multiple roles, as a graduate student, a research assistant, a teaching assistant, and a self-responsible adult. They are more autonomous in the decision of using a laptop as a tool, unlike a K12 student who will use a laptop to fulfill teachers' expectation. Meanwhile, their learning is interwoven with working, rather than an isolated behavior. They prefer to learn from working or doing in some real tasks. The vocabulary of working definitely matches more their roles and autonomy.

Theme 2: laptop provides learners a "shortcut" and allows learners to have instant access and instant action.

Laptop not only provides connection between physical locations, but also provides a connection between thoughts and action, which here I referred to as a "shortcut". All participants reported that they use the Internet and World Wide Web to find information they need. When an adult learner comes up with a question, laptop provides a shortcut to gain information through the network. It also makes instant access possible in the classroom activity. Laptop serves as a short cut between questions and answers when the topic involves online resources. Gary gave an example in which using laptop for the Internet access is a part of the classroom discussion and conversation.

"We can verify answers to some questions, or check some schedules, or check some information online."

The shortcut may also refer to as information access on learner' own laptop. Gary described the advantage of using endnotes for references,

"Once records is there, it's wonderful to be able to access very quickly when I work on the new document for citation purpose."

The shortcut implies instant actions as well. When an idea comes up, the participant usually will set up a framework of what is going to be done in a very short time and then start writing or creating a project more quickly. Sawn illustrated his writing process,

"Because of the storage system on the laptop and I was able to cut and paste parts of it. And so I was already half ways done."

Instant access implies that learner's behaviors and classroom activities are changing. This may also provide feasibility of new instructional models, say, resources-based learning. However, instant access may also have some negative influences. Gary said,

"My habit that actually go to the main library or science library to access material there, that habit"

has suffered”

Theme 3: Laptop facilitates three-dimension of writing, a metaphor of clays and sculpture.

One major task on laptop is writing. Writing on the laptop is changing the composing process. A vivid metaphor for the writing process on the laptop can be seen as a sculptor manipulating the clays to make a sculpture. The change of writing process results from at least three factors. First, because of the function of “cut and paste”, the writing process is no longer linear, and therefore, thinking during writing process is less linear. Sawn described,

“It becomes more of organics, piece that you can manipulate in ways that you can’t with a pen on paper, for definitely”

“I love cut and paste because it is just like, why not change everything because you have the old one.”

Second, the previous works stored in the laptop make writers to create a new document faster, and therefore, proportion of writing is more about revision.

“Because of the storage system on the laptop and I was able to cut and paste parts of it. And so I was already half ways done. And then what I found too was the revision, let’s see, I was thinking about revising this piece, or making it to something different.”

“I used some pieces to start a new piece or to start a new project, and it is just, I found it, I found it to be real useful.”

Third, the editing and revision process happen simultaneously. Learners enter the whole writing process quicker. As Sawn stated,

“When I began writing something, I already revise it in a very visional way and in a very, and editing it and start spell check on grammar check, already begin on revising and editing, and where’s handwritten thing you don’t do that, no.”

Therefore, mobile learners are experiencing much freedom in writing. The paper-based linear writing process is changed, and the composition process of writing a paper is more like manipulating some pieces. This nonlinear writing process may favor students who are not good at traditional writing.

Theme 4: Search and organization function of a laptop is a plus of brain retrieval system.

Search and organization function is one of mobile learners’ most favorite functions. The function can also be found in the desktop, however, laptop users keep everything on the laptop and therefore, the function seems more beneficial for them. The search and organization function definitely shares the cognitive load for users who are in need of managing materials and projects. Sawn is very happy about this function,

“The laptop itself simplified tremendously. In terms of storage, in terms of finding what you wrote or piece that you did even when it was five years ago.”

Gary shares very similar feeling,

“I’m looking for a document on my computer something I created three months ago or some resources, the search function in my computer is the obvious way to help me.”

Such function is not just for searching and organizing the word documents, but also includes all other materials on the laptop, like PDF or HTML files. It serves as a whole resource center or system for the mobile learners who have begun to give up using paper-based medium to store and organize their academic works. David described his experience in this way.

“I figure out a good system that I could have. I could look up the endnotes, and then I get number, the catalog number I get it, and I know if I have it printed it out in my cabinet. Where it is? If I have a PDF version, where it is?”

“And I index any notes that I put in. I index all my research notes. Any reading notes I take, I index.

All my papers get indexed.”

Gary gives an example of using DreamWeaver as an organizing tool.

“The tool like DreamWeaver gives you that automatic organizing of the hierarchical relationship of those documents and the hyperlink kind of relationship with the documents. That is lots of easier for me to conceptualize with the program’s help, then for me just to deal with, do way that designer just has to do it, which is just folder and documents, and then keep tracking of everything in your brain.”

Certainly, participants are satisfied with using laptop to organize the materials and projects. They feel like,
“It surely makes me more organized researcher.”

“That’s reason why I like using notebook so much, it serves to develop my system from the ground up with the notebook as a factor, I didn’t translate from paper based system.”

Computer-based searching and organizing system simplifies the management and retrieval of materials. It serves as an extension of mind by sharing lower-level workload so that learners can focus more on meta-level management, design level activity, or higher-level activity.

Theme 5: No game, no entertainment, but participants still feel trapped by the Internet and email.

Those mobile learners all use their laptops for academic purposes. They all reported that they rarely used laptops for entertainment. However, they feel easy to get lost in the cyberspace. It has been a consistent problem for learners who have the Internet connection. Gary described such trouble,

“I think, overall, it still help me more productive; however, the laptop in front of me connected to the Internet is always temptation to other kind of distraction. The World Wide Web is there, waiting for you, so there is a little person concerns with this.”

“ During any given day, I am spending too much time, just checking news, checking the weather, checking email, umm, and you know, kind of browsing, and that kind of thing, instead of intending to my next task.”

David also agreed that the Internet was so distractive and expressed the same feeling that the Internet eats up lots of time,

“It’s great to have wireless, though. If you really need to write, not having the connection is nice, sometimes.”

If temptation of the Internet access happens in classrooms, then it introduces the off-task behavior. David described his feeling when using laptop for note taking in the classroom,

“When it (laptop) is on in front of me, I am looking at it, you know, I have a hard time to look away.”

Of course, such consistent problem caused by the Internet does not mean that school should cut off the Internet connection. However, in the mobile learning pedagogy, we do need to address this issue to avoid too much off-task behavior.

Theme 6: Using laptop for note taking in the classroom still presents two folders for mobile learners.

Currently, quiet a few of students begin to bring their laptops to classrooms. They mainly use it for note taking. Learners prefer to use a laptop as a note-taking tool for several reasons. One reason is that the laptop generates better notes than handwriting, and another reason is that computer-based notes are easier to manage. Sawn said,

“I don’t have to write it by hand and then copy into computer. I can do it in computer. It cuts the time, and then I found the notes were a much better.”

“Actually, I think it was really a great idea, because what I used to do is I take notes on paper and then I lose the paper. Or I have to carry all that notebooks to class and it was too heavy.”

However, not all participants feel totally comfortable using laptop for note taking in classrooms. There are some psychological factors existed, such as be afraid of being thought as impolite or as doing some other

businesses. Gary described such factors,

"People notice you have it, if you type, then there is some sounds, although mine is very quiet, but still is not silent, so when I type, there's still some noise it makes. It also the screen, the laptop screen tends to block my view a little bit of instructor or other people in the room."

"I am rather sensitive to, I don't want to be impolite or I don't want to be disrespectful to my professor or my classmates. So, I don't let myself do very much."

In addition, laptop itself does introduce off-task activities, at least, for some learners. David described, *"It's certainly like putting a TV in front of me. I have a hard of time to pay attention to the instructor. I want to be watching TV. And that's same thing with computer. When it is on in front of me, I am looking at it. I have a hard time to look away."*

Theme 7: Not being able to see the whole thing and losing a certain level of interaction are two major concerns for those mobile learners.

Besides many other concerns like lasting period of battery or computer virus, the two concerns mentioned in the subtitle seem more related to inner mental functioning. Those participants all reported that they would like to have printed documents in some cases, especially when they want to have a whole picture of a larger document or want to make comments in the document. Printed documents provide some interactions that laptop can not provided. Sawn feels that it is necessary to see the whole document in the writing process. He said,

"Sometime I like to see whole document at once, like spread out on the table, where is laptop still doesn't allow me to do that."

"That's a limitation, which is why I still like to print thing out when I am on drafting, when I feel I have a good draft, because I want to look at the whole piece. I want to be able to page and hold one page and look at the other page."

"Periodically, after been working on it for two or three days, I'll print out it and take a look, because I'll see things that I won't find on the laptop. So maybe they compliment each other, I guess."

David described the difficulty of putting comments on computer documents.

"It's a good feel (to hold a printed document) on your hand. Hold the marker. Underline and make a little note. You lose that ability on the computer."

"I can put notes into Adobe Acrobat file, and I could circle something in it, but I got to the menu, click draw tool, and circle it, put note in. You just could not do it. I keep on grading my students assignments on the computer, and nine out of ten, I'd print them out, because it's just so much faster, just mark, mark, mark, A minus, you know, rather than focus on how are you going to put comments in."

Definitely, these two concerns come with the technology and also depend on the advance of technology. They also reflect the needs for cognitive functioning, which have to be addressed in technology-based learning environments.

We have described several themes emerged from mobile learners' experience, behavior, and perception. As a summary, more details on mobile learners' experience are presented in Table 1. These experiences are usually interwoven. Take the metaphor of mobile office as an example. It can either be seen as a usage, an effect or a benefit of using laptop. On the other hand, however, it may be a byproduct to learners with a concern of "anywhere, anytime working".

Table 1. *The experience of mobile learners*

Behavior, Outcomes, and Patterns regarding Laptop Using	
<i>Usage</i>	Write papers, e.g. spell check, and grammar check, cut and paste Do research, e.g. field notes for observation; grand applications Do assistant work, e.g. lesson planning Search information and access the resources on the Internet Store and organize materials, e.g. keeping notes, using Endnotes Use for communications, e.g. email, presentation Support team working, e.g. using track change and comments Take notes in class Prepare all class work, including comprehensive exam Create web projects Do graphic design
<i>Effects with</i>	Better quality and format of documents Less repetitive works Replace for handwriting and paperwork A coherence form to organized files Shortcut between thoughts and action. Mobile office
<i>Effects of</i>	Three Dimension of writing: manipulating the writing pieces Accommodation for personal preference and habit Be a productive constructor of the knowledge More like a designer, rather than a learner in front of a laptop Motivated to be organized Intimate partner and tool
<i>Limitations</i>	Battery dies; (Mobile learners like to have power outlets in rooms) Temptation from the Internet Email eats up time Note taking in class is still not comfortable Reading on the laptop loses a certain level of interaction compared to reading on the printed materials Not being able to see the whole thing
<i>Identity</i>	Productivity tool, thinking tool, extension of capability and the brain.

Final Words

Because of its portability and mobility, a laptop computer has become a personally intimate partner for a learner. Impacts of mobile technologies have many direct effects, like better quality and format of documents, or less repetitive works, as well as many latent effects, like promoting collaboration among peers or increasing motivation of a learner to be more organized. Such an intimate relationship is two folds. It provides convenience and instant access for learners. However, it may also eat up time of learners or become a distracting factor during the learning process. Partnership may be a most significant characteristic of mobile learning environments comparing to other technology based learning environments. Educational computing has undergone a change of focus from e-learning to mobile learning. More research studies should be done regarding how psychologies factors are influenced by this characteristic of partnership. Future research could also look into the relationship of mobile technologies and learners in a broader mobile learning space.

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