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Thomas Ngo-Ye

*Dalton State College*, [tngoye@daltonstate.edu](mailto:tngoye@daltonstate.edu)

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# Computer Literacy Challenges for Adult Returning Students, Lost in a Different Generation of Computer?

Thomas Ngo-Ye  
Dalton State College  
tngoye@daltonstate.edu

## ABSTRACT

In recent years, many adult returning students go back to school for college degree and retooling. Many of them are struggling with computer literacy skills. In this study, we try to understand the computer related challenges that adult returning students are facing. We identify the difficulties they encounter through direct observations in classroom. We also use informal conversations with students to help us understand why they have the challenges. Next, we conduct critical analysis by taking the conceptual lens of empathetic thinking and disruptive information technology (IT) innovation. We discover several factors that may contribute to adult returning students' struggles with computer literacy. Furthermore, we suggest several ways that may help adult returning students overcome the adversity. This research will contribute to our general understanding of the computer literacy challenges faced by adult returning students. The research findings also have important implications for Information Systems (IS) educators and college administrators.

## Keywords

Computer literacy, adult returning students, empathetic thinking, disruptive IT innovation, social support.

## INTRODUCTION

Computer literacy is recognized as an important element of college general education. Basic computer and application skills are expected from the new generation of workforce. For Information Systems (IS) educators and savvy computer users, these basic computer skills are easily taken for granted. Thus, IS educators may under estimate the challenge and difficulty that some adult returning students encounter when they first embark on the journey of learning such basic computer skills. In this paper, we report our first-hand observations of the struggles that some adult returning students had in computer literacy class. Through informal conversations with students, we intend to understand the root causes of these challenges. Next, we apply the approach of empathetic thinking (Kroenke, 2014) to derive a better understanding. Moreover, we employ the disruptive information technology (IT) innovation theory (Lyytinen & Rose, 2003) to explain why the computer and application skills that we attempt to teach pose such challenges to some students, even they have been using computer for many years. To help students better learn computer skills, we suggest that 1) we devote more class time on one-on-one hands-on tutoring; 2) suggest students to take non-credit basic computer class prior to the college level computer literacy class; 3) encourage students to seek external support and help.

## MOTIVATION AND BACKGROUND

Computer literacy is essential for knowledge workers in the 21st century. The importance of information technology literacy is widely acknowledged in both academia and industry. Computer literacy education intends to make people feel "comfortable" and to have "a sense of belonging in a computer-rich society" (Noble, 1984). Recently a survey was completed to identify the most popular components and make course revision recommendations (Epperson, 2010). General computing, Excel, and database are the top three most valued information technology skills mentioned by business recruiters (He & Guo, 2011). Microsoft Office is often the most cited information technology skills. For example, (Murray, Sherburn, & Perez, 2007) found that workers are expected to have proficiency in Office suite applications, based on interviews with 10 world class manufacturers. (Haruehansawasin & Kiattikomol, 2010) found that employers' expectation is higher than their confidence in their employees on their Office application skills. From self-reported student use of information technology, spreadsheets and databases are only used a few times a year, while word processing software is used more than once a month (Jones, Windsor, & Visinescu, 2011). In recent years, most high schools prepare students in personal productivity applications before they go to college. Therefore, the personal productivity tools course is removed from the recommended model IS 2010 core curriculum (Topi, et al., 2010). Personal productivity tools such as Microsoft Office course is usually offered in college. Personal productivity applications proficiency is required for all students before enrolling in any major in most institutions. There is an interesting paradox of information technology literacy documented in the literature. On one hand, many students grow up with computer and they may be comfortable with technology. On the other hand, students still struggle with technology used in the academia such as Microsoft Office (Oblinger, 2008).

Given the importance of computer literacy for students' future career, in this study we examine whether the paradox of information technology literacy is real. If yes, what causes it and how can we address it? We have been teaching a computer literacy course – “Fundamentals of Computer Applications”, in which we focus on the basic operation of Windows 7 operating system and Microsoft Office 2010. We use the textbook by (Shelly & Vermaat, 2011). We are teaching at an open access state college. The mission of the college renders us to serve not only traditional college age students but also many adult returning students. Our college entry criteria are less selective and some adult returning students do face many challenges in our computer literacy course. Some students may not be completely computer literacy ready. However, our role as instructors is to help as much as we can to students coming into our classroom.

### CLASSROOM OBSERVATIONS

In this section, we report our direct classroom observations that students encounter difficulties and challenges. The sample in this study is one single evening class of 25 students. We wrote down notes of our classroom observations immediately after each class meeting for the whole semester. The Introduction to Information Technology Literacy course is often delivered using the combination of PowerPoint lecture and student self-learning methods. Here, instead of giving passive lecture and sit back to leave students to the self-learning mode, we perform hands-on activity in class with students. Following an example tends to help students to learn more effectively (Neely & Pray, 2007; Reimann & Neubert, 2000).

However, we still observe that some students struggle in the course. Some students do not know what to do when a computer has a problem. They could restart the computer, or move to a different PC in the classroom. But they just sit around doing nothing and wait. One student (we refer her as student A) copies a URL into browser and does not know to press Enter key to get to the webpage. She does not know how to proceed. So she asks our help. A student (we refer him as student B) uploads a PowerPoint link short cut, rather than the real physical PowerPoint file to Blackboard (an online course management and learning website). Similarly, a few students upload Microsoft Access database file link short cut, rather than the real physical Access file to Blackboard. On many occasions in our course, we find some students have trouble of downloading a zip file from Blackboard and unzip it and get to the files such as Word documents and picture files. Obviously, they have no idea of zip, unzip/extract, and identify location of a file. We observe that some students download zip file and then go into it immediately in Windows 7 Explorer without unzipping the zip file. They then select a particular file inside the original zip file to work on and later find out some application options are not available. The reason is that they did not unzip the file and work on the unzipped file. This incidence shows some students have no concept of unzipping file.

In the third week of class, some students still lacked the very basic skills to use computer and network – Blackboard and zip file. Some students did not remember where they save the downloaded zip file from Blackboard. They did not know how to extract zip file and where the extracted files are. They did not know where their current working file is. Some students just opened the downloaded file and did not save file in a folder in their flash drive. This causes problem that their current working files were read only and cannot be modified and save. They did not follow the instruction to create a new folder and copy/paste file there.

Seven weeks into the semester in “Fundamentals of Computer Applications” course, we noticed that several students still did not master the process of – how to download zip file from Blackboard, extract zip file, and then locate files/pictures on local hard drive or flash drive. It seemed very hard for several students to fully master this.

Eighth weeks into the semester, one adult returning student (we refer him as student C) still did not know how to copy and paste a file. Student C did not know where to find audio files in the unzipped folder. So it seemed that he was still behind on the basic file operation tasks. For him, each small/simple step related to our course, posed a significant challenge. He told us that he got a brand new computer at home at the beginning of the semester. He had to overcome so many hurdles. First, Internet access to Blackboard had problem because anti-virus related problem. Then his new Office 2010 license key had problem. Next, two and half weeks into the semester, his new flash drive did not work. Student C was constantly setback by the technology obstacles and fell behind in the class from the beginning.

Just before midterm exam, one female adult returning student (we refer him as student D) asked us help to upload PowerPoint file of chapter 3 (PPT3) in class lab activity. Student D was not sure which file to upload to which assignment link in Blackboard, although we clearly mention the content – *Apply Your Knowledge* and page numbers in the book in the assignment. Many students were OK at this point of time. But a few students were still confused. Student D said that she still felt lost at unzip file and locate her file in a flash drive.

To be environmental conscious, instead of asking students to print out the homework and submit hardcopy, we asked students to submit all homework online to Blackboard. For exams, instead of using traditional scan-tron paper for marking answers, we asked students to download answer sheet in Excel format and fill in answers, and then upload the Excel answer file to Blackboard. It was an innovative use of technology, saving paper and money. While this approach had the merit of being

realistic in the sense that business professionals perform the same tasks of downloading, editing, saving, and uploading files in the real world. But this practice posed some serious challenges to students.

During the Word exam of “Fundamentals of Computer Applications”, Student C did not know how to upload a file to Blackboard. He did not submit any homework to Blackboard yet. After word exam, he asked us to help him to upload his answer in Excel to Blackboard. In fact, he did very well in the Word exam with score of 112.5 out of 125 for the 50 multiple choice questions. In the same Word exam, student D told us that she submitted her answer to Blackboard, but she said that she did not double check. She asked us to check on this. We thought that it should be OK, because students already had been doing this kind of downloading, editing, saving and uploading file exercise so many times in our course. So we let her go home without checking her Word exam answer file on the spot. But 24 hours later, when we graded the submitted Word exam, we found out that Student D’s submission was an empty Excel file without her answers. We had demonstrated download file from Blackboard, edit it, save it, and upload file to Blackboard so many times on big screen. In addition, we also gave out a practice test of the exact routine as Word exam. However, along with a few other students, student C and student D still did not get it right.

Given that student C actually did well on Word 2010 exam, he was OK with reading textbook and answering questions in the multiple choice format. Although he took a bit longer time to complete Word exam, he got very good score. But the problem was that student C and student D still had trouble of doing the basic file manipulation stuffs. It seemed true as the student C said, if he can get over the initial hurdle of how to operate in Blackboard and basic computer stuffs, Microsoft Office 2010 stuff was OK. Student C can follow textbook and our demonstration on big screen. The real issue for student C was that he had trouble of not knowing what to do – single click, double click, or right click. Student C had no idea of download file, upload file, save file, and rename file. Student D, who submitted the empty Excel answer file initially, later submitted the correct one. She got 110 out of 125, a very good score too! It again proved our point – novices just lack basic computer skills, although they can do very well on the multiple choice tests.

Student C did not know how to upload his saved answer file. He downloaded the file from Blackboard and performed data entry for his answers. But he did not know where he saved it. When the time came to upload his answer file, he could not find it. We helped student C by walking through the process to save the file to flash drive with a new file name and then locate it and upload it to Blackboard. A few weeks later, student C’s problem was still not able to find where he saved his file in his flash drive. So he still could not upload his homework to Blackboard. He said that he did some homework at home in flash drive, but got messed up and not able to upload them to Blackboard.

A student (we refer her as student E) did not know how to select three continuous cells in Excel. We had to show her one-on-one how to operate the mouse to select a few cells. Some other students also did not know how to select a few cells in a continuous block in Excel. This is a basic hands-on not taught in textbook, which needs an instructor personally shows how. Student D did not know how to press Ctrl key and select a few rows of cells in Excel as well.

In the third week before the semester finished, student D in “Fundamentals of Computer Applications”, like the week before, could not find the right version of Access homework. She pulled the wrong one with a lot of design errors. So we had to bring our flash drive and give her our copy of Access to work with. So until this time, she still did not manage well with her homework file, not saving the correct copy and could not find it when needed. In the last week of the semester, in the Excel exam of “Fundamentals of Computer Applications”, at least two students did not submit their answers in Excel to Blackboard. From our first-hand teaching experiences, we did observe that students coming into “Fundamentals of Computer Applications” had very different levels of computer skills. The real problem is that some students lack basic computer skills.

### **CONVERSATIONS WITH STUDENTS TO LEARN THEIR PERSPECTIVE**

“Fundamentals of Computer Applications” course does not have pre-request of computer skills. The only pre-request course is a basic math course. Student C pointed out that this was not enough. Student C expressed his interest to take a computer basic class, if being offered. Student C told us that at his work, his computer related tasks had nothing to do with Office 2010. Student C worked with computer every working day for 15 years. He was using very specific computer applications – mainframe DOS/telnet style applications, just doing some data entry job and print invoices. Microsoft Office had no role in his current clerk job. Therefore, using just one specific computer application does not help him for broader computer technology. Apparently he had no idea of basic computer concept and basic skills of file management, file, folder, copy, paste, and download. He said that he also used computer for simple tasks such as web browsing to read online news, sending emails, and playing simple Windows games. However, these simple tasks do not involve manipulation of files and folders.

Over the time, student C learned how to use the system to do data entry at work. He typed a few words into the system and hit enter to the next item and navigated the screen. The work system keeps evolving over the years. But since he did it every day, he became an expert in using it. He could train a new employee to do the same data entry job pretty easy. But knowing

how to do the clerk job with this particular work system does not mean one understands computer for other common Office tasks.

Many years ago, when new PCs arrived at the company where student C worked, he was interested in learning how to use computer. The PC had built-in tutorial. But while working on the tutorial, customers came in for service. Student C had to stop it and served customers. When customer left, he could not resume the tutorial, because there was no such pause function or he could not find it. It was not like playing VCR tape, when one can stop it and resume later. He had to restart from the very beginning again. The same interruptions by customers happened over and over again. He never got the chance to complete the tutorial. Finally, he was so frustrated with it and decided to just forget about it. Anyway his job did not require him to know how to use a computer for doing other tasks. He just needed to know how to do data entry and navigate the few specific applications. And that is it. So he never got to learn the general computer tasks – such as single click, double click, right click, copy and paste words/files, create folder, copy and move folder. These simple basic computer tasks were taken for granted by people who know them. But for other people who have no such training or experience, it is a major challenge.

Student C also mentioned that for things he did not do frequently, it was easy to forget. It is all about practice. Besides computer usage related to work (limited to a few very specific applications not requiring manipulation of files and folders), the only things he did with computer were web browsing and playing Windows games. We asked student C that you used computer every day for work for 15 years and why did you still struggle in our computer class? He said the problem is that he only did simple data entry. If pulling any one on the street and train him/her, then he/she can do the data entry job. After repeating and doing the same simple computer task many times, one can do it as a second nature. But what he did at work has nothing to do with Office 2010 and file manipulation. Thus, he had no idea of basic computer stuffs. He does not know when to double click, when right click, how to copy and paste, how to move file around, and how to create a new folder.

There was another female adult returning student in our class (we refer her as student F). Student F came back to school two years ago. In the beginning, it was so hard for her, just like for student C right now. But fortunately she knew someone living nearby who can help her a lot. Luckily she got hold of someone to help her. Also her daily job required using computer.

#### **EMPATHETIC THINKING AND DISRUPTIVE INFORMATION TECHNOLOGY INNOVATION**

One lesson we learned is that even if sufficient coverage is given, for example demonstrating downloading and unzipping a zip file from Blackboard 5 times, a few students will still struggle. Maybe we should devise a different teaching strategy after twice of demonstration. Probably the one-on-one personal tutoring approach works better.

#### **Ego Thinking and its Fallacy**

The assumption that every student knows basic computer stuff is wrong. The fundamental reason behind such false assumption is ego thinking – thinking other people should know and behave just like ourselves (Kroenke, 2014). If some computer tasks are easy for us, it must be easy for others. People tend to over generalize it to others. Therefore, it is hard to be neutral and have an objective view to understand people other our group. Many people fail to recognize that the huge differences among people in terms of computer background and past experiences. Our observation demonstrates that the assumption is not true. In our class, we witnessed many students struggling with basic computer operations.

#### **Frequency of Usage**

If we do not perform certain computer tasks for a while, we will forget the skill. Students come in “Fundamentals of Computer Applications” course with different background, levels of knowledge, and skills in computer application. It is unrealistic to expect in a few class meetings to make up the skills gap. If a student does not use the application before, and not use it outside this class, they have very limited chances to practice the computer skills. That might be one reason why it is so hard for some students to catch up on basic computer skills. After all, it may take years’ experience to internalize the operation of computer basic stuffs. If one only uses one application once a week or month, one is going to forget how to do it. Frequent practices help retain the skills. Therefore, maybe the key is that if a computer application or task is not a routine part of daily work and life, it might be very hard for people to retain the knowledge and skill. Therefore, previous experience with computer and outside activities with computer may be very important. We cannot expect a student with little experience with the computer applications to learn and retain a lot of the new knowledge, if there is little usage of the applications outside this “Fundamentals of Computer Applications” class. For student C, his job did involve using computer. However to do his job, he only needed to know a very few applications and repeated it every day.

#### **Disruptive Information Technology (IT) Innovation**

Another important reason of all these observed problems is that these skills are traditional thick-client Windows based basic skills. Many students were not familiar with these tasks. People from old mainframe era – student C or others working in a fast food restaurant taking orders, doing data entries would not understand file manipulation in the thick-client windows

based environment. For many students, they can use Facebook/Tweeter, but not windows based thick-client applications, organize files, folders, sub-folders, zip and unzip file. We also observed many students in “Fundamentals of Computer Applications” class just click a file from Blackboard and open it, rather than save to local hard disk or flash drive. They had no concept of file, folder, save, and windows file operations.

Computer applications evolve from one generation to the next. It has the character of disruptive IT innovation. In the past decades, computer technology progress in a disruptive innovation manner. Under old mainframe applications and DOS like applications, screen navigation has no need of mouse and GUI concept. Windows based applications and file operations are dramatically different from previous generations of computer technology. However, in the Internet era, the web-based systems are again disruptive (Lyytinen & Rose, 2003). Because of this very disruptive nature of computer innovations, knowing simple web stuff, like reading online news, checking web based email, does not translate to knowledge of manipulating files and folders in Windows environment. In general, one generation of computer skills do not transfer to the next disruptive technology.

The specific mainframe applications student C faced had DOS like interface. Student C only used keyboard to type a few things and hit enter or tab keys to navigate. It was so different from Windows based application – which involves files manipulation, mouse, and clicks. Internet based web application is another major leap. However, it is so different from windows based applications. Here is the problem – people locked in one generation of computer skills cannot easily transfer the existing skills to a different generation.

Thus, the take home message is that for people without basic computer skills – defined as Windows file manipulation, copy paste, even a seemingly simple and easy task is a mounting challenge. To help Windows novices overcome the basic hurdles, instructors need to hold hands and tutor closely. It may be very time consuming. However, once this basic Windows skill hurdle is overcome, novices can do as well as others for Office 2010.

Hence, job experience with computer, even with many years of using computer, does not necessarily translate to basic Windows/Office skills. This finding poses a great question to the government’s plan of retooling workers replaced from sunset industry. For student C, although he used computer on job for 15 years, yet his narrow computer exposures rendered him lost in a different generation of computer. We can imagine that what happened to student C also applies to many other industrial blue-collar workers who are in similar situation. In the recent recession since 2008, many working class Americans lost their old jobs. The government created many programs and provided financial aids to help those working class workers back to school to get education and retooled for future new jobs. Can this be successful? Based on our limited direct classroom observations and conversations with some adult returning students, just placing them in college computer class and providing financial aid are not enough to solve the problem. Many workers were used to do just one narrowly focused job and using just one computer application. They repeated it year after year. This kind of past job experience did not help them for broader computer knowledge and skills. These adult returning students may not be computer novice in the traditional sense because they did use computer for work for decades. In fact, we observed that in department stores like Sears and Belk, they are still using old style mainframe applications with DOS like interface – no need of mouse. These workers just do not possess the basic skills of modern applications – modern in the way of Windows applications – GUI, mouse based click, and file manipulation. These workers are fine with simple web applications, such as reading news online and sending emails via web. Therefore, for many adult returning students, their computer experience resembles kind of U shape curve. They may be fine with old mainframe applications and new simple web tasks, but not the Windows based thick-client applications. For both mainframe application and web application, student C said that he knew it by doing the same thing over and over again. However, neither mainframe application nor web application involves Windows file manipulation. Moreover, neither skills transfer to Windows GUI file manipulation.

### **Importance of Social Support**

From our conversation with students, we discovered that social support play an important role in helping students gain computer literacy skills. In the context of this study, social support refers to that one can tag on and count on someone else for help to overcome the technical hurdles. Someone can be a family member, relative, friend, neighbor, or coworker. For many students, it was so hard that they cannot learn well based on mass lecture and general computer lab activity, where the instructor cannot afford individual attention. In such scenario, having access to social support goes a long way.

### **CONCLUSION**

IS educators and college administrators may assume that every student is computer literate and knows the basic skills. In this study, we find that this assumption is wrong. Some adult returning students do lack basic computer skills, although they have used computer for years at their job. It is very hard for these students to overcome the initial hurdles to become computer literate in the contemporary age. From informal conversations with these students, we discovered a few potential reasons of

their challenges. First, these students do not use Office and Windows file operation as frequent as knowledge workers. Second, due to the disruptive nature of IT innovation, these students' narrow prior experience with mainframe applications and newly acquired simple web skills do not transfer to thick-client Windows based basic skills – file operation and Office. Third, these students lack of social support when encountering computer difficulty.

After understanding the situation, we make the following policy recommendations. 1) when possible, IS instructors may devote more time on one-on-one hand-holding tutoring, which is more effective than mass lecture or lab; 2) we suggest some students take non-credit basic computer class prior to the college level computer literacy class, so they can catch up the basic skills; 3) we encourage some students to seek external social support and help for their computer challenges.

This study has several potential contributions. The findings of this work may help some students to release certain stress related to the computer course. It may also help them realize that they are not alone when facing the computer literacy course challenge. Students may find that it is normal and natural to have the struggle with new generation of technology. Moreover, there are some potential ways to improve adult returning students' learning of computer literacy. We acknowledge that this exploratory study has its inherent limitations. We draw conclusions only based on our observations in one class and unstructured informal conversations with some students. To enhance the validity of this study, we need to increase sample size and employ more structured and systematic method in the future. However, the current study as the first step does lay down a solid ground for further investigation.

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