

A Study of the Personal Digital Assistant Promoting the Teacher's Instructional Innovation

Kuo-hung Tseng¹, Chi-Jen Lee², Hua-Lin Tsai², Tien-Sheng Tsai²

¹ Department of Business Administration
Meiho Institute of Technology

²Department of Industrial Technology Education
National Kaohsiung Normal University
*No.188, Zhongyi St., Fengshan City, Kaohsiung County 830
Taiwan, R.O.C.

Abstract This study aims at understanding how Personal Digital Assistant (PDA) is used to promote the innovation of teaching. It adopts the focus group interview with six Technology teachers of public primary schools in Kaohsiung. The study found that these teachers' innovative teaching is stimulated with the help of their professional knowledge and sharing of teaching experiences. Finally, as reference material, it concludes by making suggestions for educational government authorities, primary school administration departments and teachers who utilize PDAs to achieve teaching innovation.

Keywords PDA, Teaching innovation.

1 Introduction

In recent years, with the emerge of Internet, Information Appliance (IA) has become the hot product in new age, the more maturely developed in the market of which, the PDA, has appeared as in great demand among various kind of enterprise who try to partake in the web economy. In view of rapid technology development, it's inevitable to introduce high-tech products into education. Many examples of technology combined with teaching exist both domestic and abroad such as computer, Internet[5], the laptop computer, hand held computers, the projector, television, videotape, radio, etc. Having witnessed that, the PDA is expected as another tool incorporated into education, enhancing students' diverse contact and application of the cutting edge, and then further analysis and comparison in order to create new or convey the information acquired.

Nowadays the trend is to push for proper utilization of science or information, so teachers at the frontline of pedagogy should actively search different sorts of teaching way and concept.

Therefore, the goal of this study is to know the process of case teachers encouraging innovative teaching with help of Personal Digital Assistants as reference.

2 Literature review

2.1 PDA's development history

PDA, short for Personal Digital Assistant, was coined by former Apple Inc. CEO John Scully in January 1992. As one type of the palmtop, PDA is the miniaturized computer with smaller size. Thanks to affordable price and applicability, it's seen as the future star of high-tech products[1].

Palm OS and WinCE are the two dominant operating systems for PDAs, among which the Palm OS takes more of the pie on the market because of earlier entry into the market[6]. Palm OS and WinCE work for different hardwares; IBM, SONY[6], HandEra, COMPAQ, Symbol and Palm itself use Palm OS. The PDA, one of the Palm Pilot family, in discussion in this study uses Palm OS too.

Palm Pilot was created by Jeff Hawkins. In early 1990, he finished GridPad, the prototype palmtop in the world while working as the vice GM for development in Grid Inc. Despite huge size and unagreeable appearance, some believed it'd become popular in the future and began to develop. In 1992 Jeff Hawkins established the Palm Computing Inc[7]., which later developed Zoomer in cooperation with Casio Inc. But the Apple announced Newton, HP and Sharp also made public their versions in August 1993, two months earlier than Zoomer, and then Zoomer didn't sell well. Besides, too big size and lack of practicability so far, the market response wasn't good, so gradually many companies stopped

investing in PDA development until 1996 Jeff Hawkins introduced the prototype Pilot 1000 of the Palm family with Graffiti the handwriting identification system and pocket size and single item sale price 299 dollars, which was well-received in the market. While developing Pilot 1000, the Palm Computing Inc. was bought by U.S.Robotics which was merged by 3COM in 1997. As a result the Palm Computing became a department of the 3COM. The 3COM announced Palm III's entry into the market in 1998 spring, which with good marketability established Palm Pilot market share ever since [8].

2.2 Definition and market situation

With widespread Internet service, the Internet has become an indispensable part in daily life. In the trends of digitalization, broad bandwidth internet and interactivity, conventional electronic-wares are being integrated with networked computers, and more and more consumers retrieve information through client access. Due to the complex and expensive conventional connection onto the Internet via computers and for meeting specific demands, the Information Appliances do away with the PC's complicated architecture and occur as simple, low price and consumer-oriented. At present time there hasn't been a clear definition of the Information Appliances but as shown by existing related products all which can be networked or exchange information with another IA device can be described as IAs. Generally speaking, IAs can be categorized into three using environments. The first includes such as netphone, window-based terminal in the enterprise users market; the second comprises net TV, internet game console, television set topbox and screenphone, etc. in the household market; the third involves carry-on products such as the hand-helds, smart cellphones, MP3 players, wearable Web Pad of personal market.

According to IDC definition of smart palmtop aka PDA, it's without keyboard, processes and manages personal data, unsophisticated text edit function, inputs by means of handwriting, weighs less than 1 pound, adopts open source operating system or non-open source operating system. However, with the diversification of the function of various kinds of hand-held IAs, PDAs' capability extend from simple event record keeping to communication, sending or receiving emails, internet connection, so it's not easy task to set a boundary for a PDA. Practically, one device can be said to be a PDA as long as it provides some

sort of personal digital assistance. Now the US is the main market of PDA, occupying around seventy percent, among which the retail has thirty to forty percent, indicating the PDA has been gradually accepted by the public. In view of this the Handspring, after being authorized for OS by the Palm, quickly entered the consumer market and caused hot purchase all the way from cyberspace net shops to large computer sale shops. Before Palm reacted with M100 in August 2000, it once possessed twenty-six percent in the American retail market in less than six months. The second large market is Japan, where according to survey the sale was 994,000 units in 1999, about fifteen percent in the global market. But in 2000 its global share decreased to twelve percent despite global rise of some forty percent to one million and two hundred sixty four thousand units. Thus far in the world the multinational PDA companies include Palm, Handspring, Compaq, Hewlett-Packard, Casio, IBM, and Sharp, while domestically in Taiwan there have been the Acer, Asus, etc. joining PDA manufacturing.

2.3 Type and characteristic

As far the market condition is, the PDA standards are not unified, which in general can be assorted into the following five types in accordance with distinct operating systems:

1. Palm OS: The Palm Computing Inc. made public his first, the Palm Pilot, with Palm OS the operating system in 1996. The initial concept of design is to take note of one day's tasks such as schedule, contact and address lists, and notebooks, simultaneously copied to a portable and handy Personal Information Manager (PIM) device. As the big environment changed, users' demand were no longer limited to pure PIM function, so more and more companies joined in a common effort to develop Palm OS application software, which not only explored new use but also settled the basis for the Palm.
2. Windows CE: Microsoft announced Windows CE, a modified version for the PDA from desktop Windows operating system in the end of 1996 and the next year entered the market together with the matching hardware. Windows CE 3.0 is the mainstream version and PDAs with Windows CE 3.0 or more advanced version are generally called Pocket PCs. Apart from PIM function, Windows CE also provides the same multi-tasking and file system as of a desktop. From the users' perspective, Pocket

PC works just as a mini-type computer, much more than only a personal information manager.

3. EPOC:EPOC is the most popular hand-held device operating system, beside being used for PDA, also often used in mini-type computer and cellphone. Its main characteristic is that its core technology includes powerful transmission and communication protocol and Java programming, which enable it to perform excellent in air-transmit tech and internet. However, the version supporting Unicode
4. Penbox: Designed by Taiwan company.
5. Others: Designed for specific purposes.

2.4 Comparison with other products

The tool of collection of the materials is chosen must consider several main points : 1. There should be light , small characteristics, it is apt to carry using. 2. There must be display device of enough size, in order to cooperate with the graphical display of the space materials. 3. Can transmit the materials with the desktop computer , save the question of the construction again of the materials. The electronic product which accords with above-mentioned conditions is the following three: Note type computer (Notebook) , Tablet PC and PDA. Note type computer function and desktop computer are close most[4], it uses the operating system the same as desktop computer, with touch and accuse of the board in order to import interfaces , and has offered various kinds of hardwares to support with the keyboard (store on device , RS232 , USB ,etc. and transmit interfaces such as the laser disc machine , floppy disk machine ,etc.), hit the most complete products of function for the three. But allocate completely , need to carry the screen analogous to the size again , make its volume compared with weight and other two products dislike slightly cumbersomly. Tablet PC is the synthesises of note type computer and PDA, its use and note type computer rule[5]

One dose of similar ones touches the accusing of type liquid crystal screen in order to show the device, has given up the keyboard and adopted importing interfaces handwrittenly type the same as PDA; The storing device (Flash Memory) or hard disk will flash soon to store the device respect and use. Advantages of Tablet PC are at the same time the high-speed treatment ability with note type computer and PDA humanized introduction way. It is unable to control in the range that is carried that the volume and weight of most Tablet PC remain unchanged at present, it is used in moving from the shorter office that only suitable for; In addition, Tablet PC use and note type

comparatively similar processor of computer, the ones that are not as good as PDA are saved in the part of the power consumption, have reduced it and used value on in the other family property [2]The minimum , lightest electronic product of weight , about 100 to 200 grams of weight that PDA hits the volume for the three, use and touch the liquid crystal screens and handwritten type introduction interfaces of the accusing of type. Utilize PDA carry on materials collect most heavy advantage lie in small and exquisite appearance their lighten burden , homework of personnel, but the speed of PDA processor is slower, the problem smaller and of storing the more capacity of screen will be the shortcoming needing overcoming .

Compare according to the above, Tablet PC has bigger screens and fast operation ability, has better behavior with the arithmetical materials to represent in the space materials; PDA has advantage that a light and handy appearance opens and uses promptly at the same time, is suitable for carrying , using for a long time. The two have used the introduction interface of the pen type , it is convenient , practical for the use that is collected in the materials to relatively had the note type computer (keyboard is input). Consider prices and carry two convenient factors, choose to use PDA as the tool of materials collecting and management in this research[5].

2.5 Application in Education

Many kinds of teaching methods of pointing out in websites of U.S.A. [1]that the palmtop computer is in education, and is suitable for the project that Taiwan implement, set out the following of arranging and offer a domestic researcher to consult :

(1) Manage the application respect:

1. Newer journey is noted down at any time.
2. Follow the trail of student's progress in know-how.
3. Use the electronic calculator.
4. Deposit and withdraw student's information immediately, such as the planning chart, demography, or keep in touch with parents.
5. Organize one's own reading the booklist .
6. Take notes in the meeting or in having a class.
7. Write down and tabulate the apolegamy of showing.
8. Store and use the course project.
9. Store and track students' IEPs.
10. Track , put the stock inventories of the chemical laboratory and security information in order and control.

- (2) Communication and cooperative application
 1. Convey the E-mail .
 2. Convey or receive the fax.
 3. Regard as a terminal machine.
 4. Regard as the cell-phone .
 5. Spread high school activity information to the student and parents.
 6. Exchange information between the colleagues.
 7. Share the webpage information downloaded with others.
 8. Convey home and assign the work to parents.
 9. Let students use the electronic way of the work to pay.
 10. Sign for parents.
 11. Convey the file from your PC .
 12. Write out an e-book and share with others.
 13. Have on-line course.
 14. Convey or receive the instant message.
 15. Implement the activity of writing of group.
 16. Record the note of explaining.
 17. Receive on-line education incident and news.
- (3) Teaching and application in study
 1. Represent or store the digit photo.
 2. Produce the trial balance.
 3. Draw.
 4. Draw the concept picture to summarize the whole chapter.
 5. Procedure that produced or predicted or solved .
 6. Can follow the trail of your class plan , task , and grade .
 7. Write down and observe in a field is studied.
 8. Read the e-book.
 9. Localization that the global satellite of use navigates.
 10. Study and create the music.
 11. Materials figure .
 12. Observe and use maps.
 13. Utilize the probe to collect the temperature , luminance , voltage , pH value and materials of other projects.
 14. Can arrange one's own palmtop computer's application program .
 15. Lead measurement to study.
 16. Regard as the note-book in the classroom.
 17. It is handwritten to practise.
 18. Practise the foreign language.

19. Collect and analyse the materials of the environmental topic .
20. Note down the incident immediately.
21. Regard as the dictionary and check words.
22. Set up to students and note down healthily.
23. Practise 1999 multiplication table.
24. Use the periodic table.
25. Manage the cooperative programme .
26. Make photograph book.
27. Listen to and study the classical music.
28. Read the present major issue.
29. Study astronomy.
30. Set up glossary by playing with words .

3 Study method

Probe into relevant documents according to the purpose of studying in this research, choose eight to step the school and step grade's grade teacher and do in order to study the case, rely mainly on research law of the quality, and complement and carry on research in order to the making investigations law.

3.1 implementation procedure

The research procedure of this research, after probing into relevant documents, select the case teacher participating in studying; Secondly, according to studying and needing to draft half a structure interview outline first, and after revising via the experts and scholars, then carry on group's interview of the focus ; And then use the type on the palm individual by teacher's reality of the case PDA' experience, through time of focus group interviews , understand it utilize implement palm type individual several assistant on teaching gains that practice work. And propose the primary school with the auxiliary teaching of PDA of technological individual of teacher type on the palm of life naturally , improve the transition situation innovated in teaching.

3.2 study tools

3.2.1 study the background of the case

Research this have eight case in all, individual several user of assistant all at ordinary times, and apply it to teaching. So, these eight teachers become this representative case of research.

3.2.2 an expert of the interview outline result spends the target

This expert in order to set up the interview outline of research result degree, have deep use experience and research via PDA to individual, and have background of educational speciality , seven experts teaching in the special school institute of

the skill , the expert taking on this research interview outline together consults the marriage partner.

4 Analysis and discussion

Analysis via the interview text, divide and state it as follows:

4.1 the case teacher is using in PDA individual initial stage , almost there is no help to the innovation of teaching.

The case teacher is using individuals in the auxiliary teaching initial stage of PDA, PDA' every application function is waiting to be familiar with to individual; So, it is unable to innovate teaching helpfully.

The case teacher puts forward the following view:

I have thought of a new idea in the school, deal with the achievement that PDA applies the class to, the beginning not using, because it use skillfully very, (AA01)

Sometimes even than bring paper is it take a lot of trouble to write down:

PDA prevails very much now, I study those technological upstarts, family and student all support very much, cooperate and use in the teaching activity even more, just the students all look forward to the new function of PDA very much, and I am often disappointing [4]

Because it can not operate very much.

4.2 because of the increase of teacher's use experience of the cases, and then stimulate the innovation of teaching.

The teachers will do some good to use experience with growth of time while using individuals PDA, relevant websites offer the consultation of various fields and get in touch , irritate the teachers and carry on the try innovated in teaching.

The instance is as follows:

I find to from the procedure of creating , may apply to teaching PDA at network often, I myself am in the experiment at present, teach students and try too, the result has not been verified (BB02) yet.

I will put forward one's own experience and gains in relevant websites of PDA too once in a while , hope that can utilize the mutual view on everybody , has never expected that there are teachers that have unexpectedly left some suggestions on me on websites, PDA becomes my new assistant of teaching[3]!

4.3 PDA individual apply to teaching, it has not already been rare, the users have already utilized and promoted teaching to innovate.

The PDA have been assisting a personal technological assistant all the time , the teachers use individuals although the proportions of PDA are not high, with the facility of the internet network, these use past master to concentrate it in the network , form application of a share agitation , harangueing it to apply to gains on teaching, teaching innovates to using PDA teachers , it is no longer a fresh noun . PDA share the gains to individual on the case teacher now, analyse that descriptions as follows:

Think that there should be different ideas, the thinking that must be creative, so, everybody is using the experience of PDA, will discuss in the network, I once have no intention of finding to a website, have been covered with in one above the good hand enables sharing diligently, let me learn many (FF03)ly.

Utilize PDA drawing, write down with the technological form of observing the plant of the open air of course of life naturally , teachers and students can share experience too, is really interesting, students think it very fresh (hh05) too.

4.4 assistants of PDA individual, besides innovating in teaching, it is the fountainhead innovated in teaching even more to lead the teacher to be exposed to and use technology.

The teacher in this case can apply teaching to know valuable technological specially, teaching it innovates to be new result that technology bring, but it touches the key element mainly, it is teachers that use technology , introduce the technological

products at the teaching scene, use technology to assist the learning aid, let the children can reflect the intention of technology in the technological society. The case teacher proposes that the evidence is as follows:

The child who plays with technology is really very happy, we play with PDA by oneself, the children play with GameBoy, PDA is not the thing very difficult to understand at all for them, PDA is very easy to accept for child, a teacher speak to work as us, more simple and more convenient, the ones that have it are auxiliary, writes down one grade of affairs item of class every day, I would not forget (EE05).

Because of PDA, let me welcomed by students very much in the school, they will say I hand-carry a bikini computer, very serious oh! Too because so, I daily note computer too, single rifle products of projector etc. come to assist teaching, technology gives me much feeling of freshness and value. (GG04).

5 Conclusion

The interview texts of this eight case teachers of research basis analyse, find it as follows:

- (1), case Mr. use one initial stage such as assistant such as individual, innovation in teaching almost there is no help.
- (2), because of case increase, Mr. of use experience, and then stimulate the innovation of teaching.
- (3), individual several assistant apply to teaching, it has not already been rare, the users have already utilized and promoted teaching to innovate.
- (4), of the individual several course of assistant, except innovating in teaching, lead the teacher to be exposed to and use technology, it is a fountainhead innovated in teaching even more.

The use of the technological products, bring very great additional value on teaching to the teachers, the ones that will used in initial stage are raw, it is unable to apply to teaching immediately to cause; But it will use it is technological teachers of products, it seem not it is cost altogether to having

and speciality, will not be discouraged because of being such, will make more efforts to try the new products instead, and then promote teaching to innovate. The PDA are only a tool, and talents using it are the most important factor, because the teachers' new products of try, make the best of multimedia characteristic, individualized demand, convenience of taking away of this digit tool, is it utilize technological products come innovative teaching to pursue, offer individual several assistant among several plural use that message use, upgrade the use of the aspect and expansion of the development field. Among research this, echo, and this result, is it is it is it use new developing technology use and consult in the future on teaching education partners that practice works to try to like more to offer.

Reference

- [1]K12 Handhelds. 101 GREAT EDUCATIONAL USES FOR YOUR HANDHELD COMPUTER. Retrieved October, 3, 2004, from the World Wide Web: 2002, <http://www.k12handhelds.com/101list.php>
- [2]McCarthy, J.(2000). The PalmGuru Report On Palm and Pocket PC. PC 2000 Magazine.
- [3]X. Vila, et al., "PDA-based Interface for a Computer Supported Advanced Learning Technologies, 2003 (ICALT'03)
- [4] Oliver Holme and Mike Sharples, "Implementing a Student 2002.
- [5]Karsten Menzel, Raimar J. Scherer, "Information Management for Project Based Teaching Supported by Mobile Devices" 2002.
- [6] Jill Attewell, et al., "MLEARN 2003: learning with mobile devices", The second annual MLEARN conference, 19-20 May 2003 [5] The m-Learning Project, <http://www.m-learning.org/>
- [7]The MOBILearn Project, <http://www.mobilearn.org/>
- [8]Douglas E. Comer, "Internetworking with TCP/IP - Principles,