A Study on Digital Divide and Relevant Factors of Adult Students in Supplementary Junior High Schools

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ABSTRACT

Digital divide means that the gap between those who are able to access and use information and communication technologies and those who are not. This gap is closely linked to a serial of interactively relevant “divides”. Governments around the world are aware of the digital divide not only as a divide of information and digital technology, but also as a divide in every aspects of life in the knowledge economy, that is to say “dual digital divides”. The current divide between the digital rich and the digital poor may be enlarged further if the divide cannot be coped with timely. Educational and learning are the key remedy to the divide. It can therefore be expected that the study of adult students’ digital divide will enhance our understanding to the digital divide and of how to design digital learning and curriculum planning and teaching activities for adult students. Thus, the purposes of this research are below: 1) to look at the digital divide of adult students in supplementary junior high schools; 2) analyze the relevant factors that may influence digital divide of adult students in supplementary junior high schools; 3) to recommendations for the government and adult teachers respectively based upon the results drawn from this research.

Keywords: adult student, digital divide

PREFACES

With the new century coming, Organization for Economic Co-operation and Development (OECD), International Monetary Fund (IMF), United Nations (UN) and World Bank Group announced uniline the report: 2000: A Better World for All. The report advocates crossing the digital divide is the essential condition for being competitive. This claim has been confirmed by eight leaders of industrial countries in Japan in 2000. They all agreed that for solving the phenomenon of digital divide, they will set up a Digital Opportunity Task Force (Johnson, 2000). By the way we can find out that digital divide is a significant and serious concerned problem in the whole world, because it can effect the competition of the country.

The core strategies of solving the digital divide are education and learning, because educational institutes should offer the needs and foundations of lifelong learning and technological literacy for individuals, and learning in school, family, community and workplace can make up for digital divide. Therefore, education is really an important access to overcome the difficulties of digital divide, and teachers are the key persons. But in fact, there are still some teachers got the difficulties in digital divide, and there are still some differences existing among educational institutes and families. Hence, researchers think it’s necessary to understand the condition of digital divide among adult students in Taiwan first, then we will know how to solve the problem and retard the difference between owner and non-owner.
For non-owner of technological skills, it means they have fewer opportunities to join information technology, and they will be deprived of the probability and chances to get the profits from education, training, shopping, entertainment, business and even communication. It’s really a pity that lots of adult students ignore it. Sallis & Jones (2002) listed some effects of digital divide that may happen:

1. It will threaten people's work and development, and even exclude the opportunities to join in the society. Moreover, it may cause the serious isolation for many people.
2. It may cause the employers of new economy can’t find the employees.
3. Being disadvantageous learners, people may lose the opportunities to lifelong learning.
4. Digital divide may produce some misunderstanding between the skilled kids and un-skilled parents.

Therefore, the significance of this research is to awaken those adult students who don’t use the technology and to prevent them from being confined to a disadvantageous situation, especially in work market, lifelong learning access, and further learning etc.

**Purposes**

There have been many researches focusing on the digital divide of students in Taiwan for these two years, but most of them targeted on elementary school students and junior high students. Researcher thinks it’s very important to explore the situation and effects about the digital divide among adult learners, according to the result, it can help us known more about how to arrange digital learning, arrange the courses, and make better learning plans for adult learners. In view of the above, the main purposes of this research are as follows:

1. Explore whether the phenomenon of digital divide exists among adult learners in junior complementary schools in Taiwan.
2. Analysis the related factors that affect digital divide among adult learners in junior complementary schools.
3. According to the result, we hope to offer some suggestions for adult educators and educational administrative organizations on making decisions and teaching.

**LITERATURE REVIEW**

**Adult Learner**

According to the regulation of civil law, an adult means people who are over 20 years old. The adults according to the law mean they can possess all the rights and have to finish the responsibilities according to the regulation of the law. So, the object of this research will focus on the adult learners who are over 20 and join the supplementary junior high schools in Taiwan. What are the characteristics of adult learners? They can be sorted by three principles. In comparison, it can be compared with children and adolescents. In degree, it means to compare the differences among adults and among adolescents and children. The third is from different viewpoints, some researchers explore from physiology, some from psychology, and some from social viewpoint. Most of studies put emphasis on the comparison between traditional students and non-traditional students, because adult learners in educational system mean the recurrent to school after they have finished the initiate education.

**The Intension and Effect Factors of Digital Divide**

If people stand on the wrong side, some will be stuck there the whole life. So it makes the educators all around the world face the hard challenge. They have to transfer the difficulties of digital
divide into digital integration, and make sure everyone can get the skills to join in digital economy (Sallis & Jones, 2002). It really needs the adequate strategy of government, because information and communication technology will cause a more serious cleavage in society without it. Because those who can get the access to use information and communication technology will get richer, and get more ability to pay for renewed technology. Moreover, for well-educated, out of proportion, they can grasp the opportunities to lifelong learning, and get better learning service. In short, those who are well-educated will be richer, and those who are poor-educated will become poorer (McNair, 2000).

Sallis and Jones (2002) analyzed the reasons, just as follows, 1. poor-educated people owned lower education degree and were lack of basic skills; 2. lack of computer skills; 3. lower-income and poor; 4. lack of the access to digital technology; 5. social and racial factors; 6. computer cost; 7. telecommunication cost is higher; 8. some people don’t think it’s really related with daily life. For those who felt isolated in the society and community will be excluded from the information society most easily. Namely, those who were in the edge of society will be in the danger of letting behind of information technology. There are some potential users, including elders, the handicapped, low-technique and low-income employees, minority groups and those who rely on welfare. Generally, those we talked above are lack of the access to computer technology, ability and confidence.

Canada government made a survey in 2000 to figure out the situation of digital divide (Reddick, Boucher & Groseilliers, 2000). According to the findings: there were three types of non-users: 1. the respondents recognized internet can meet the needs in their daily life, but those who were 44 years old or younger faced some basic obstacles, such us lack of money and skills; 2. the respondents whose age were between 45-55, faced the techniques and charge obstacles, and they can’t recognize how valuable the internet is both to individuals and society; 3. the respondents , whose age were over 55, considered that internet was unfamiliar to them, and they won’t never be interested in it. Among all the types of non-users, researchers pointed out the differences between genders, and female non-users were 61%, male were 39% (Reddick, Boucher & Groseilliers, 2000).

Center for Educational Research and Innovation (2001) indicated that there were two important factors to affect digital divide, including the demographic factors: social background, races, age and educational degree; geographic divide: cities, areas and countries. All mentioned above will cause the differences of access to use computers and internet. Some researches showed that: compared with people with computers at home, the respondents without computers in their family preferred to connect on the internet in the public library or in the community. The rate was 1:1.5 (NTIA, 1999; Center for Educational Research and Innovation, 2001). Center for Educational Research and Innovation (2001) made a survey all over Australia, Canada, France, Italy, Sweden, Turkey and American, then it found that the access of computer and internet was influenced by social economy condition, race, and educational degree, and some countries (Australia, Canada, and Italy) got a more serious difference because of the geographic divide. The researches in American and England agreed on this conclusion (NTIA, 2000; Center for Educational Research and Innovation, 2001). In England, the researcher tried to divide families into ten parts by their income during 1998-99, and 1999-2000. They found that the rate of getting on the internet was low, 3%; the rate of the richer families can reach 48%. Among the 40% poorest families, just less than percent got the access into internet (Center for Educational Research and Innovation, 2001). But at school, the difference between diverse races and social groups was little. In fact, white kids and high-income kids made use of computers more than other groups (Centre for Educational Research and Innovation, 1999; NTIA,1999; Center for Educational Research and Innovation, 2001).
Integrated all the related studies in Taiwan (Chiang, 2004; Chen, J. J., 2002; Chen, J. Z., 2003; Chen, W. J., 2004; Hsiung, H. T., 2004; Huang, U. L., 2004; Li, C. J., 2004; Li, C. W., 2002; Liu, Y. C., 2003; Shen, W. I., 2003; Yang, H. Z., 2003; Yang, Z. C., 2004; Wu, I. S., 2004; Zheng, C. W., 2003), we can understand the time point, the purposes of the researches, the present conditions of digital divide in Taiwan, and the related factors with digital divide. To sum up, the intensions of digital divide involved the differences among the opportunities to information technology, contents of information technology, and information literacy. On the other hand, from the international researches, we recognized that the related factors to affect digital divide conclude social economy conditions, race, age, educational degree and geographic divide. Nevertheless, most of data were collected from the researches on traditional students. Less research focused on adult learners. We tried to explore the related factors with digital divide on adults, and to fill up the data we need.

RESEARCH METHOD

The survey instrument was compiled according to the related questionnaires and the findings of literature. 385 samples from the population were contacted for conducting a pilot study. The available sample was 177, and the returned rate was 46% for the pilot study. After that, this instrument was modified again. According to the result of factor analysis, the questionnaire of information literacy and self-directed digital ability got good respectable alpha value, and the internal consistency reliability was .92 and .90 separately. Wholly speaking, the questionnaire contained six parts: basic data, opportunities of information technology, content of information technology, information literacy, information education and equipment at school, and self-directed digital ability.

The target population of this research was supplementary junior high school students in 2005. Data resource was from the statistics of local governments. Target population was 3,454, stratified random sampling was used. 150 copies were sent to north area, 200 to central part of Taiwan, and 310 to south area. The total was 660 copies.

FINDINGS & DISCUSSION

Findings

The participants of this study were composed of 396 adult learners, who were above 20 years old, and most of them ranging from 41-70. Those who aged 51-60 were the most, up to 41% of all. About four fifth (80.4%) were female, and less than 20% were male learners. Almost half (46.5%) of sample didn’t have a job, and those who were on service engaged in service trade (36%). 76.8% of the sample were married, and 74.5% of them lived with their children. The characteristics of the participants were shown as follow:

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<thead>
<tr>
<th>The characteristics of the participants</th>
<th>N</th>
<th>Percent</th>
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<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>71</td>
<td>80.4</td>
</tr>
<tr>
<td>Female</td>
<td>291</td>
<td>19.6</td>
</tr>
<tr>
<td><strong>Age groups</strong></td>
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<td></td>
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<tr>
<td>21-30</td>
<td>33</td>
<td>8.8</td>
</tr>
<tr>
<td>31-40</td>
<td>30</td>
<td>8.0</td>
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</table>

*Table 1: The characteristics of the participants*
As to the opportunities to using information technology, more than four fifth (80.9%) got computers at home, just 66.8% of the participants can get internet access. Anyway, two third of the participants can get on the internet at home. For those without computers at home, the main cause was that they can’t use it, and the second reason was they don’t need it. As to the main reason for those who can’t get on the internet, “they can’t use it” was the key reason, and the second were” no need” and “lack of enough facilities”. For those who can connect with the internet, 74.8% used broadband network. As to the place they used to get into internet was home, the next was school, and seldom would utilize the library and community network center.

As to the opportunity to information technology in workplace, the participants got few chances to use the computers. In fact, for those who still had a job, 63% of the workers didn’t have any computer equipment in their workplace; moreover, 68% said it’s unable to get into internet. The main reason that they didn’t use computers or internet was ‘no need’. To sum up, more than 84% of the participants have had used the computers.

As to the contents of making use of computers, the main purpose was to do the homework, and the next was to get on the internet or to play computer games. The websites they liked to surf were for education, for daily life information, and for entertainment. How did they search for the information on the internet? They preferred ‘importing the key words’ and ‘typing the website directly’. As to the main trouble for them to get on the internet was that it was unfamiliar for they to get the information they needed. Few of them thought the slow speed was the trouble, too.

As to the information facilities in school, 57.3% of the participants indicated that they used the computer or got on the internet in computer class, or in the library, but almost 14% of the participants said there were no enough facilities to get on the internet at school. As to the computer classes, almost half of the respondents (45.7%) said they had two computer classes a week, but there were still 17.2% of the respondents said they had no class related with computer or internet. In fact, those who had no chance to computer classes suggested they can have some computer and information technology class at complementary school. For those who took computer classes, almost three fourth mentioned that they

<table>
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<th></th>
<th>Career</th>
<th>Marriage status</th>
<th>Lived with children or not</th>
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<tbody>
<tr>
<td></td>
<td>Agriculture, fish, wood, herd, mining</td>
<td>Married</td>
<td>Single</td>
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<tr>
<td></td>
<td>Manufacturing</td>
<td>275</td>
<td>47</td>
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<td></td>
<td>Service trade (transportation, food, business)</td>
<td>Divorced</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Military, official business</td>
<td>Widowed</td>
<td>15</td>
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<tr>
<td></td>
<td>Technology</td>
<td>Others</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Have no job</td>
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<th>41-50</th>
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<td></td>
<td>51-60</td>
<td>41.3</td>
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<td>61-70</td>
<td>11.3</td>
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<td></td>
<td>More than 70</td>
<td>.5</td>
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</tbody>
</table>

41-50 | 82 | 22.0 |
51-60 | 154 | 41.3 |
61-70 | 42 | 11.3 |
More than 70 | 2 | .5 |
can use one set by themselves, just few said they had to share the computer with classmates. The contents of computer classes at complementary school contained the basic concepts and rules of computers, the usage of computer class, how to surf and search for information by internet, importing methods, and archive and printing.

**Relationship Between Adult Learners’ Demographic Characteristics and Digital Divide**

1. the usage of internet at home: There were just one item (live with children) was found the difference (\(\chi^2=8.381, p=.015^*\)). Those who lived with children could get on the internet (79.0%) more than those who didn’t live with children.

2. the method to link with the internet: The difference of three items (gender, age, and live with children) were found.

**The Purposes of Using Information Technology**

1. The purposes of using computers: Age difference was found in all demographic items by Chi-square test (\(\chi^2=71.441, p=.000^{***}\)). Doing homework was their main purpose to use computers (33.6%), and the next purpose was to get on the internet (24.0%), and the third reason was to play computer games (23.6%).

2. The purposes of getting on the internet: Gender difference (\(\chi^2=14.525, p=.024^*\)) and age difference (\(\chi^2=64.606, p=.002^{**}\)) were found. No matter male or female, the main purpose to get on the internet was searching for some information, but one fifth of female (21.3%) would like to learn on the internet. For making friends by net, male (10.7%) were more than female (3.4%). As to age difference, those who aged 51-60 would learn something by net more than other age group (50.0%).

3. The types of websites: Gender difference didn’t exist, but age, career, marriage, and living with children or not all influenced what types of websites they visited. The differences were stated as follows:

4. the way to search for information: There were no difference existed between the variable of gender, career and whether living with children and the way to search for information, but there were age difference and marriage status difference.

5. The troubles to get on the internet: Age difference was found (\(\chi^2=43.061, p=.001^{**}\)) with the troubles to get on the internet. For those who aged fewer than 20, they thought the low speed of internet was their main trouble, but for aged more than 20, the main trouble was that it’s not easy and familiar for them to search the information they wanted.

**Information Literacy**

T-test and one way ANOVA were used to test the difference between demographic characteristics and information literacy of the respondents. Age difference was found (F=2.454, p=.026*). Those who aged 51-60 had lower information literacy than aged 20 (t=.5679*) by Post Hoc analysis.

**The Environment & Digital Divide**

By Chi-square test, there were no difference between areas and the universality of computers (\(\chi^2=.159, p=.924\)). Moreover, we found that all the variables (including the university of internet at home, the way to get on the internet, the purposes of using computers, the purpose of getting on the internet, the types of websites, the way to search for information, and the troubles to get on the internet) had no difference with areas that the respondents lived in.
Demographic Characteristics of the Respondents & Self-Directed Digital Ability

According to the respond of the participants on the questionnaire of self-directed digital ability, we found that 83% of the respondents indicated that they were interested in operating computers (the response were ‘strongly match’ and ‘match’). And 91.6% of the respondents considered it did help them to self-development by using computer and getting on the internet, moreover, 87.8% of the respondents thought using computers made them feel happy, but just 72.3% indicated that they can decide to learn computer technology by themselves. Over four fifth of adult learners (88.%) would try to learn the computer information, and they thought they would keep the responsibility for their own learning because they thought it was important for them to learn something by computers (86.6%). Nevertheless, less than three fourth of the respondents expressed they knew how to get information from information technology, and just 65.2% believed that they can use computer and internet to solve their questions. Therefore, there were 84.7% of the respondents expressed they would like to learn new and useful related knowledge. Wholly speaking, most of respondents had high interest in digital learning, and would join in learning related knowledge spontaneously. T-test and one way ANOVA were used to test the difference between demographic characteristics and self-directed digital learning ability of the respondents. Age difference was found (F=2.847*). Those who aged fewer than 60 had higher self-directed digital learning ability than aged above 70, and those who aged 31-40 had higher self-directed digital learning ability than aged above 40 by Post Hoc analysis.

CONCLUSION

1. The participants structure of this study was female, aged 51-60, married, without a job, and most of them lived with children.
2. As to the access of making use of technology, more than 80% of the respondents owned computers at home, and 67% can get on the internet at home. The main reason that they didn’t own the computer and internet access was they don’t know how to use it. The respondents preferred to use computers and internet at home.
3. The adult learners indicated they had less chance to use computers in the workplace, and the main reason was that there were 63% of workplace without information technology faculties.
4. The main purpose to use information technology was to do their homework, and the main trouble was that it’s so unfamiliar for them to search for what they need by net.
5. At school, computer class was the major place they can use computers. The other place was library. At present, 75% of the respondents indicated that junior complementary school had arranged computer classes for them, and they could use one computer on their own.
6. Those that aged 41-50, and lived with children got higher percent to own computers and get on the internet than other age groups and those who didn’t live with children.
7. The main purpose to get on the internet was to search for data. Those who aged 51-60 would learn something by net more than other age group (50.0%). Most of the respondents surfed life information and educational websites more. Those who didn’t live with children surfed recreational websites more. The method of searching for information, the respondents preferred to import the website or type the key word by searching engine.
8. Those who aged 51-60 had lower information literacy than aged 20 (t=.5679*) by Post Hoc analysis. Other groups had no difference between.
9. All the variables (including the universality of internet at home, the way to get on the internet, the purposes of using computers, the purpose of getting on the internet, the types of websites, the way to search for information, and the troubles to get on the internet) had no difference with areas that the respondents lived in. As to information literacy, respondents in north and central areas got higher information literacy than respondents in south areas.

10. Most of respondents had high interest in digital learning, and would join in learning related knowledge spontaneously.

**Index of Lists**

List 1: Comparison of various technology users

List 2: The differences among various demographic variables and the situation of using computers at home

List 3: The differences among linking to network at home and gender, age and living with children or not

**REFERENCES**


