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Investigation into the Internet literacy of elementary and junior high school teachers in Taiwan

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ABSTRACT: The purpose of this study was to find out the Internet literacy of elementary and junior high school teachers in Taiwan. The sample consisted of 1,408 elementary teachers and 450 junior high school teachers. The total of sample size was 1,858 teachers. The usable returned questionnaires were 976 and the usable return rate was 52.53%. The difference of the overall Internet literacy between male and female teachers held a significant t-value of 4.07 at the $a < 0.01$ level, which indicated that male teachers were generally more literate than female teachers regarding the Internet. In terms of age differences, the younger teachers were, the more literate on the Internet they were. However, there was no significant difference detected between principals, directors and teachers regarding Internet literacy. Finally, there was also no significant difference found among metropolitan, city, rural and remote areas concerning the Internet literacy of the investigated population. Conclusions and suggestions are presented at the end of the paper.

INTRODUCTION

Computer technology has a significant impact on almost every aspect of our lives, including education. The International Society for Technology in Education (ISTE), the largest non-profit professional organisation that supports computer-using educators around the world, has suggested a set of 13 fundamental skills and concepts to act as the foundation standards for teacher preparation programmes [1]. Among the 13 skills and concepts, the ability to *use computer-based technologies to access information to enhance personal and professional productivity* was proposed to be achieved in teacher preparation.

Networking - the linking of computers over communications lines - is opening up a world of opportunity for students, teachers, and educational administrators. All of the elementary and junior high schools in Taiwan have established online interactive hook-ups for students and teachers to communicate within the school, as well as among schools locally, nationally or internationally [2].

Nationwide, elementary and junior high schools can now take advantage of central government funded communication highways, which are encouraging data sharing as never before, with the potential for significant information gains by individuals. The more powerful the computers are, the more sophisticated the communications speed can be achieved [3]. Telecommunications involve the transmission of data, such as spoken or written words, images and sounds, over short and long distances. Some examples are: electronic mail (e-mail), Bulletin Board Systems (BBS), voice messaging, file exchange, local and remote online database retrieval, real time interactive voice, video and data interchange, video conferencing and File Transfer Protocol (FTP) [4].

The Internet is a huge and amazing worldwide system of voluntarily interconnected networks with literally millions of documents, resources, databases and a variety of methods for communicating. What kinds of Internet literacy should teachers need to possess in elementary and junior high schools? After a literature review, six factors of Internet literacy were identified [5-9]. These factors are listed in Table 1.

Internet literacy is a basic and critical competence for all teachers in Taiwan. It is worth investigating whether the elementary and junior high school teachers possess proper Internet literacy [10][11]. The purpose of this study was to find out the Internet literacy as per Table 1 of elementary and junior high school teachers in Taiwan.

THE DESIGN

Population and Sample

The population of the study was full-time teachers who taught at elementary and junior high schools during 2001 in Taiwan. The sample consisted of 1,408 elementary teachers and 450 junior high teachers, bringing the total sample size to 1,858 teachers.

Instrument

The research instrument was developed by the researchers to elicit personal background information and the degree of competence in the Internet literacy of teachers at elementary and junior high schools. The instrument included 24 Likert-scaled items. Five professors reviewed and revised the questionnaire and ensured content validity. On the other hand, the Cronbach *a* was 0.97, indicating that the instrument also held consistency and stability.

Table 1: The six factors of Internet literacy.

1. The concept of Internet: a. The concept of e-mail. b. The concept of TCP/IP. c. The concept of domain names. d. The concept of Archie, Gopher, WWW and FTP. e. The concept of Netnews, Telnet and BBS.
2. Searching WWW sites: a. Search engine application. b. Recognise all kinds of home pages. c. Search documents. d. Apply search engines.
3. Set Internet system: a. Connect to the Internet. b. Apply proxy server. c. Set automatic group. d. Key in Internet address and use browser.
4. Homepage management: a. Switch homepage. b. Manage favourite sites. c. Print, transfer and save documents. d. Set method for appearing home page.
5. Utilise e-mail: a. Check and write a new e-mail. b. Use attachment of a file. c. Set font of mail.
6. Manage file of an e-mail: a. Manage the box for incoming mail. b. Establish address and write an e-mail. c. Receive and read e-mail. d. Set up an e-mail account.

Data Collection

The questionnaires, including a cover letter and a stamped envelope, were mailed out to elementary and junior high school teachers. Two weeks later, a follow-up letter and the questionnaires were mailed out again in order to increase the return rate. The returned questionnaires were 1,049 and the usable returned questionnaires were 976, yielding a usable return rate of 52.53%.

Data Analysis

SPSS/PC 8.0 Package was employed to analyse the collected data with a number of descriptive and inferential statistical techniques such as frequency, mean, standard deviation, percentage, t test and one-way ANOVA.

RESULTS AND FINDINGS

Among the returned questionnaires, 45.6% subjects were male teachers and 54.4% were females. In terms of the age distribution, 13.7% of teachers were in the bracket of 22-27 years of age, 27.0% were 28-32 years of age, 25.3% were 33-39 years of age, 12.4% were 40-44 years of age, 12.2% were 45-49 years of age, and 9.6% teachers were over 50 years of age. According to the positions, 6.1% of teachers' positions were principals, 19.1% of teachers were directors while 74.8% of respondents were full-time teachers. Based on the location of the respondent, 33.5% of teachers taught in metropolitan areas, 18.3% of teachers taught in a city, 16.6% of teachers taught in rural areas, while 31.6% of teachers taught in remote areas. This information is elaborated on in Table 2.

Table 2: Sample size and percentage.

Category	Group	Size	Percentage
Gender	Male	445	45.6%
	Female	531	54.4%
Age	Under 27 yrs	134	13.7%
	28-32 yrs	264	27.0%
	33-39 yrs	247	25.3%
	40-44 yrs	121	12.4%
	45-49yrs	119	12.2%
	Over 50 yrs	94	9.6%
Position	Principal	60	6.1%
	Director	186	19.1%
	Teacher	730	74.8%
Location	Metropolitan	325	33.5%
	City	179	18.3%
	Rural	162	16.6%
	Remote	309	31.6%

As shown in Table 3, all the comparisons of the Internet literacy between male and female teachers were significantly different at the $a < 0.01$ level. Among the t-values, 4.71 was the highest for *set Internet system*. This indicated that female teachers were less able than male teachers regarding the setting up of Internet systems. However, the smallest significant t-value fell on the *utilise e-mail* scale; this revealed that male teachers utilised e-mail more capably than female teachers. However, it should be noted that it held the smallest difference between male and female teachers. Lastly, the difference of the overall Internet literacy between male and female teachers held a t-value of 4.07; this means that male teachers were generally more literate than female teachers in Internet usage.

Table 3: The comparison of the Internet literacy between male and female.

	Gender	N	Mean	SD	t
Concept of Internet	Male	445	15.77	4.98	3.88**
	Female	531	14.50	5.17	
Searching WWW sites	Male	445	13.20	4.30	4.34**
	Female	531	11.97	4.45	
Set Internet system	Male	445	12.11	4.29	4.71**
	Female	531	10.81	4.26	
Home page management	Male	445	12.64	4.53	4.00**
	Female	531	11.47	4.60	
Utilise e-mail	Male	445	10.45	3.32	2.32**
	Female	531	9.94	3.56	
Managing e-mail files	Male	445	13.37	4.53	2.19**
	Female	531	12.73	4.60	
Total Internet literacy	Male	445	77.53	22.97	4.07**
	Female	531	71.42	23.76	

** P<0.01

In terms of age differences, there was a significant F-value at $p < 0.001$. According to the Scheffé's follow-up tests, teachers

in the age group of 22-27 years old were more literate than the age group of 40-44 and the age group of over 50; the age group of 28-32 was more literate than the age groups of 40-44, 45-49 and over 50; and the age group of 33-39 was more literate than the age group of over 50. However, the age group of 45-49 was more literate than the age group of over 50. These results indicate that the younger the teachers were, the more literate on Internet they were, and vice versa (see Table 4).

Table 4: The comparison of the Internet literacy among different ages.

Groups	Mean	Source	DF	SS	MS	F	Scheffé
Under 27	79.07	Between	5	37602	7520.4	14.43**	1>4
28-32	80.70	Within	971	507190	521.3		1>6
33-39	74.25	Total	976	544792			2>4
40-44	68.50						2>5
45-49	71.06						2>6
Over 50	60.30						3>6
							5>6

** P<0.01

As shown in Table 5, the mean of the Internet literacy from teachers was higher than from directors and principals. However, the F-value failed to reach a significant level, which means that there was no significant difference between principals, directors and teachers regarding their Internet literacy; they were equally competent in Internet usage.

Table5: The comparison of the Internet literacy among different positions.

Groups	Mean	Source	DF	SS	MS	F
Principal	69.02	Between	2	2915.72	971.9	1.75
Director	73.22	Within	974	541876	555.77	
Teacher	74.93	Total	976	544792		

In terms of location differences, teachers from metropolitan and from remote areas achieved higher means than those from city or rural areas (see Table 6). It revealed that it was more convenient for teachers from metropolitan and remote areas to use the Internet. However, the F-value failed to reach a significant difference level.

Table 6: The comparison of Internet literacy among different locations.

Groups	Mean	Source	DF	SS	MS	F
Metropolitan	75.36	Between	3	971.95	323.98	0.58
City	73.60	Within	973	543102	558.17	
Rural	73.10	Total	976	544074		
Remote	76.02					

Generally speaking, teachers from different locations tended to use the Internet equally literately. Therefore, there were no location differences in the Internet literacy for teachers from elementary and junior high schools in Taiwan.

CONCLUSIONS AND SUGGESTIONS

Based on the results of the study, generally speaking, teachers in elementary and junior high schools hold above average Internet literacy. However, they lack knowledge of the concepts in Archie, Gopher, WWW and FTP, as well as Netnews, Telnet and BBS. They cannot set the proxies of servers and automatic groups. In addition, male teachers are usually more competent in using the Internet than female teachers.

Moreover, the younger the teacher is, the more competent he/she is on the Internet. This might be because there were more courses covering computers and the Internet for younger teachers to select in their pre-service education. The older the teachers were, then they had less chances to encounter computer-related courses. Finally, there were no differences in positions and locations. No matter what the positions the teachers had and/or no matter where the teachers were located, they held similar competences in Internet literacy.

A number of suggestions follow from this research. First of all, in-service programmes should be offered to raise the teacher's Internet literacy in order to enrich their teaching. Secondly, when setting up in-service programmes, gender differences and age differences should be taken into account in order to meet the needs of various teachers. Thirdly, the educational administration should offer a number of incentive policies for teachers to attend in-service programmes to promote teachers' Internet literacy.

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