



Effects of Teachers' Information Literacy on Lifelong Learning and School Effectiveness

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Technology change is a key factor in the change of lifestyles in the society in the 21st century. The rapid alternation of computers, the Internet, and smart phones has human beings live in the information-built environment. Information technology is also applied to measure the modernization of a nation. A lot of countries even list computer learning as a primary course in the compulsory education, as the one mastering the latest information in the information flood could dominate everything and present better competitiveness in the world. Such a trend reflects on the education, especially the informatized administrative environments and information integrated instruction in schools, because convenient network information enhances interpersonal interaction breaking through traditional restrictions of space and time. Aiming at the teachers of universities in Fujian Province, total 500 copies of questionnaires are distributed, and 276 valid copies are collected, with the retrieval rate 55%. The research results show significant correlations between 1. information literacy and lifelong learning, 2.lifelong learning and school effectiveness, and 3.information literacy and school effectiveness. This study could help educational sectors better understand the current situation and discover the encountered problems and challenges. Based on such situations, suggestions are provided for education sectors. In addition to the academic contribution, this study also presents the value for practical reference.

Keywords: higher education, information literacy, lifelong learning, school effectiveness, Information utilization

INTRODUCTION

Information is unexpectedly flowing in human life regardless of one being willing to or getting prepared for it. In such information era, dealing with and facing such

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information become an essential key ability for modern people. It is now the new era of global village and internationalization as well as the new generation focusing on knowledge economy and information technology. The quantity of information is rapidly increasing with geometric series. People have to face and handle such large quantity of information that information literacy becomes a new skill for people and reveals major effects on human life. It is now a new era with changeably and unpredictably explosive information, which presents the characters of constant generation, consumption, and distribution of information or knowledge; even the definition of information is replaced by faster, more comprehensive, and digital exchange. Lobiedat (2011) mentioned that the 21st century was not simply the century of knowledge economy, but was the time of information explosion, when people were closely connected with information at learning, work, leisure, or living.

The lack of information literacy abilities might result in not adapting to the information technology of "If you can one day renovate yourself, do so from day to day and let there be daily renovation." Consequently, information literacy has become a central issue in modern societies and a necessary ability and the essential skill for a job that the relative research is increasing.

Accordingly, cultivating citizens with information literacy, well utilizing information technology, actively promoting information education, and creating lifelong learning abilities demand immediate attention so as to adapt to future development trend as well as cope with approaching challenges. Sufficient equipment of computer hardware and software could not guarantee the excellent instructional effectiveness in a successful instructional environment of information technology; more importantly, teachers with adequate information literacy appear the greatest benefits on information instruction. Nations with advance education stress a lot on information technology integrated instruction, in which teachers' information literacy is a key factor. For this reason, this study aims to explore the effects of teachers' information literacy on lifelong learning and school effectiveness.

LITERATURE REVIEW

Information literacy

Grizzle & Calvo (2013) explained information literacy as a set of abilities to discover, retrieve, analyze, and use information; such abilities allowed students

State of the literature

- Nations with advance education stress a lot on information technology integrated instruction, in which teachers' information literacy is a key factor. For this reason, this study aims to explore the effects of teachers' information literacy on lifelong learning and school effectiveness.
- Cultivating citizens with information literacy, well utilizing information technology, actively promoting information education, and creating lifelong learning abilities demand immediate attention so as to adapt to future development trend as well as cope with approaching challenges.
- Sufficient equipment of computer hardware and software could not guarantee the excellent instructional effectiveness in a successful instructional environment of information technology; more importantly, teachers with adequate information literacy appear the greatest benefits on information instruction.

Contribution of this paper to the literature

- The establishment of indicators is related to the direction of the information education. Formulating teachers' information literacy key indicators therefore allow teachers setting goals with the reference standard of indicators to indirectly enhance the information literacy.
- A school should encourage teachers learning for higher degrees or hold various courses to enhance the competence so as to promote teachers' information literacy and induce the instructional creativity. A school has to become a learning organization to conform to the trend in the approach era of lifelong learning.
- The suitable teachers are selected and home teachers and professional teachers are adjusted the positions so that all teachers in the school are able to do administrative work or home teachers, expand the opportunities to participate in school affairs, and increase experiences and opportunities so as to enhance teachers' information literacy abilities

searching, filtering, utilizing, writing, smoothly completing research, and, most importantly, assuming in order to become actual lifelong learners. Information literacy was the important gain of a person knowing where to acquire the best and the most utilizable information and how to access information and, most importantly, being able to evaluate information and judge the accuracy, appropriateness, and effectiveness. Chang (2012) pointed out information literacy as the key ability to solve problems, reasonably and effectively communicate and interact with the outside, and be usefully for long. It not only allowed people becoming lifelong learners, but could have individuals experience the fun in acquiring knowledge to further create the constant and active learning motivation in the life. Koppa et al. (2012) regarded information literacy as the key ability to solve problems, i.e. an individual perceiving the time for information and being able to effectively apply proper information tools to search, acquire, evaluate, and use various types of information. Information literacy was not innate, but acquired with proper education and training (Weidert et al., 2012). Allen & Seaman (2011) defined information literacy as the necessary skills and fundamental human rights for lifelong learning in the information era, including the abilities to recognize information needs, find out, evaluate, effectively and ethically use information from people, paper, digital, and audiovisual media, and apply information to create and exchange knowledge, involving in interdisciplinary learning, critical thinking, and interpretation skills. Li et al. (2013) explained information literacy as presenting knowledge and skills with information, being able to operate information software and hardware, applying information to work or daily life, and collecting, organizing, evaluating, and utilizing effective information, including understanding the competence of computer software and hardware, the network application of computers, the integration of audiovisual media, and the concept of information ethics (West et al., 2012).

Lifelong learning

Chan Lin (2013) pointed out lifelong learning as planned or unplanned learning activities, according to personal interests and needs, in the phases of individual life. Lifelong learning aimed to enhance an individual developing the potential and fulfill the life ideal. Guay et al. (2014) explained that an individual constantly learnt knowledge, conceptual attitudes, and technological abilities in order to adapt to the environment for survival; the content of lifelong learning literacy for elementary students contained the abilities to cultivate enthusiastic learning attitudes, present fundamental cognition, learn how to learn, learn transformation, well use learning resources, and teamwork (Murphy et al., 2011). Botha & Makoelle (2012) regarded lifelong and comprehensive learning being covered in lifelong learning, referring to all meaningful learning activities in various living environments in individual life, containing formal learning, non-formal learning, and informal learning, and aiming to enhance personal knowledge, affection, skills, and abilities to further enhance personal abilities of career development, life adjustment, and innovative responses and promote social progress and national development (Pérez & Murray, 2010). Kurtulus & Ersoya (2011) considered lifelong learning literacy as teachers, after acquiring teaching positions, continuously acquiring, updating, and promoting knowledge, skills, and attitudes with formal, non-formal, and informal methods to enhance the attitudes, abilities, and habits of self-actualization and professional growth and to develop the quality of skills and affection for the cognition of lifelong learning (Skaalvik & Skaalvik, 2010; Marcia, 2015).

School effectiveness

Happell & Gaskin (2014) defined school effectiveness as dominant principals, high expectation of students, concordance of organizational climate, high teacher-student ratio, and more reading space for students (Kuo et al., 2015). Akalevu & Narayan

(2010) pointed out school effectiveness as the achievement of goals by productive school climate and culture, students' acquisition of important learning skills, appropriate supervision of students' progress, practice-oriented teacher development, excellent leadership, parents' active participation, arrangement and practice of effective instruction, students' high expectation and demands, and other relative factors. Lee et al. (2012) regarded school effectiveness as a school presenting favorable performance on various dimensions, including students' academic achievement, principal's leadership, school climate, learning skills and strategies, school culture and value, and teacher development, so as to achieve the preset goal. Pentecost et al. (2012) defined school effectiveness as school leaders applying leadership strategies and various effective routes to acquire necessary resources from external environments of the school and integrate static, mental, dynamic, and ecological dimensions in the school organization to achieve the school goal, satisfy personal demands of teachers, staff, and students, and enhance the development of school organization through operation (Wu & Hwang, 2010). Chen & Lin (2011) defined school effectiveness as the degree of a school achieving the preset educational goal, covering the specific performance of students' achievement, teachers' instructional goal and professional growth, administrative performance of the school, and school climate. Lokar et al. (2011) considered school effectiveness as the degree of a school achieving the organizational goal, including principal's leadership, administrative communication abilities, teachers' curriculum design and instruction, teacher satisfaction, teacher-student relationship, students' academic and behavioral performance, and parent-community relationship (Sema, 2015).

Deduction of research hypothesis

Brooks & Normore (2010) found out the factors of economic conditions, employment types, learning experiences, and information literacy in adults' lifelong learning attitudes, where the ones with younger age, higher education attainment, occupations of student, soldier, and public servant, higher economic conditions, and information background could better present lifelong learning attitudes (Lloyd, 2010). Choi & Jeff (2012) revealed the positive effects of social capitals and information literacy on lifelong learning attitudes, i.e. the higher social capitals and information literacy, the higher lifelong learning attitudes. Besides, information literacy and social capitals showed positive effects on the predicted explanatory power of lifelong learning attitudes (Seamans, 2012). Consequently, the following hypothesis is proposed in this study.

H1: Information literacy reveals significant correlations with lifelong learning.

Davis (2013) found out moderately and highly positive correlations between lifelong learning culture and school effectiveness and significantly predictive power of task-oriented, learning-oriented, and competition-oriented lifelong learning culture towards school effectiveness. In other words, a school with task-oriented, lifelong learning, and healthy competition culture would enhance the school effectiveness (Lombard, 2010). Butler (2012) pointed out the remarkably positive correlations between teachers' lifelong learning and teachers' efficacy with moderate correlations. In this case, teachers' lifelong learning literacy indeed appeared close relationship with teachers' efficacy (Sharma & Gupta, 2012). The following hypothesis is therefore proposed in this study.

H2: Lifelong learning shows notable correlations with school effectiveness.

Cassell & Hiremath (2013) regarded the higher teachers' information literacy, the better perceived school effectiveness that the function of information literacy would affect the promotion of school effectiveness, with positive correlations; information literacy presented high prediction on the overall school effectiveness, where the evaluation of information was the major predictive variable. Fraillon et al. (2013) found out the higher teachers' information literacy, the better perceived administrative effectiveness that the excellence of information literacy abilities would influence the promotion of administrative effectiveness in a school and

information literacy showed positive explanatory power on the administrative effectiveness, where information cognition appeared the best explanatory power (Siwatu, 2011). Hsieh (2011) discovered that high school and elementary school teachers presenting higher information literacy would show higher job performance, and information literacy revealed obvious influence on job performance; high school and elementary school teachers' personality traits and information literacy appeared obvious predictive power on job performance. In this case, the following hypothesis is proposed in this study.

H3: Information literacy presents remarkable correlations with school effectiveness.

METHODOLOGY

Operational definition of variable

Information literacy

Referring to Chang (2012), information literacy is divided into information perception, information selection, information utilization, and information evaluation in this study.

1. Information perception: including the fundamental acquaintance of hardware equipment, software systems, Internet resources, information security and ethic regulations of computer information.

2. Information selection: indicating to utilize information from proper resources, know the types of data and the methods to search for resources, including recognizing and understanding personal information demands, and effectively state and express information problems.

3. Information utilization: indicating to understand the collected data contents, analyze and organize them into useful information, accurately apply information to effective and creative decisions, organize and combine new knowledge with known knowledge, and transform them into business tasks.

4. Information evaluation: to critically analyze and evaluate acquired information, evaluate and modify personal conditions of information search and use, and self-evaluate the adequacy of acquired information so as to solve business problems and evaluate the effectiveness and efficiency to solve problems with information.

Lifelong learning

Referring to Guay et al. (2014), lifelong learning is divided into cognition, skills, and affection in this study.

1. Cognition: to understand lifelong learning and promote human quality, enhance the relationship between social progress and national competitiveness, realize the necessity and influence of lifelong learning, and present accurate cognition of constant learning. Professional growth, adaptation to social changes, coping with reform measures, and effective problem-solving could merely be completed through lifelong learning.

2. Skills: containing the skills of self-learning, career planning, communication abilities, critical thinking, information collection, resource application, problem solving, and obstacle removal, in addition to basic living skills, and being able to promote specialty, create responses, transform data into knowledge and intelligence as well as being able to proceed learning activities and sharing and exchanging alone or cooperating with others and to present relative outcomes.

3. Affection: being able to cultivate motivation and induce drive, being glad to learn and enjoying learning, presenting independent willingness and strong interests, presenting active attitudes towards knowledge acquisition, accepting and

being brave to face learning frustration, participating in study activities, constantly applying learning outcomes to review and improve, and delivering the importance of lifelong learning to others.

School effectiveness

Referring to Chen & Lin (2011), school effectiveness is classified into administrative performance, teachers' teaching quality, and students' learning performance in this study.

1. Administrative performance: In addition to a principal's leadership styles and the communication performance among members, the departments could negotiate and communicate with and support each other to develop the cooperative spirit.

2. Teachers' teaching quality: Teachers could utilize free and break time for discussing instructional contents with other teachers in order to improve the instructional skills and are able to use instructional media and computer-assisted instruction for innovating teaching design and improving materials and instruction so as to enhance the teaching quality.

3. Students' learning performance: In addition to students' learning motivation, learning attitudes, writing assignments, acquirement performance, aesthetic concepts, and seeking for knowledge, students' learning activities and the learning achievement on contests present certain level.

Research subject

The teachers of universities in Fujian Province are distributed 500 copies of questionnaires through mails. Total 276 valid copies are collected, with the retrieval rate 55%. The sampled universities in Fujian Province contain Xiamen University, Fuzhou University, Huaqiao University, Fujian Agriculture and Forestry University, and Fujian Normal University.

Analysis method

Regression Analysis is applied to understand the relationship among students' information literacy, lifelong learning, and school effectiveness.

EMPIRICAL DATA AND ANALYSIS

Factor Analysis

Information literacy

The information literacy scale in this study, with Factor Analysis, is extracted four factors of Information Perception (eigenvalue=3.446), Information Selection (eigenvalue=2.837), Information Utilization (eigenvalue=2.343), and Information Evaluation (eigenvalue=2.062). The accumulative covariance explained achieves 80.594%.

Lifelong learning

The lifelong learning scale, with Factor Analysis, is extracted three factors of Cognition (eigenvalue=2.755), Skills (eigenvalue=2.289) and Affection (eigenvalue=1.873). The accumulative covariance explained reaches 76.873%.

School effectiveness

The school effectiveness scale, with Factor Analysis, is extracted three factors of Administrative Performance (eigenvalue=2.166), Teachers’ Teaching Quality (eigenvalue=1.751), and Students’ Learning Performance (eigenvalue=1.388). The accumulative covariance explained achieves 73.699%.

Validity analysis

Information literacy

The innovative strategy scale, after the validity analysis, appears the reliability coefficients of information perception 0.83, information selection 0.86, information utilization 0.88, and information evaluation 0.81.

Lifelong learning

The innovative strategy scale, after the validity analysis, reveals the reliability coefficients of cognition 0.85, skills 0.82, and affection 0.89.

School effectiveness

The innovative strategy scale, after the validity analysis, shows the reliability coefficients of administrative performance 0.88, teachers teaching quality 0.84, and students learning performance 0.80.

RESULTS AND DISCUSSION

From Table 1, the first regression tests the effect of information literacy on cognition, presenting the positive influence of information perception, information selection, information utilization, and information evaluation on cognition ($\beta = 2.275, p < 0.01$; $\beta = 1.735, p < 0.05$; $\beta = 1.834, p < 0.05$; $\beta = 2.166, p < 0.01$). The second regression tests the effect of information literacy on skills, showing the remarkably positive influence of information perception, information selection, information utilization, and information evaluation on skills ($\beta = 1.762, p < 0.05$; $\beta = 2.186, p < 0.01$; $\beta = 2.291, p < 0.01$; $\beta = 2.287, p < 0.01$).

Table 1. Regression Analysis of information literacy and lifelong learning

Dependent variable Independent variable	Lifelong learning					
	Cognition		Skills		Affection	
	β	P	β	P	β	P
Information perception	2.275**	0.000	1.762*	0.021	2.073**	0.006
Information selection	1.735*	0.026	2.186**	0.000	1.697*	0.039
Information utilization	1.834*	0.017	2.291**	0.000	1.942*	0.013
Information evaluation	2.166**	0.000	2.287**	0.000	2.154**	0.000
F	16.423		21.377		26.825	
R ²	0.233		0.257		0.289	
Adjusted R ²	0.142		0.161		0.183	

* $p < 0.05$ ** $p < 0.01$

Data source: Self-organized in this study

The third regression tests the effect of information literacy on affection, revealing the notably positive influence of information perception, information selection,

information utilization, and information evaluation on affection ($\beta = 2.073, p < 0.01$; $\beta = 1.697, p < 0.05$; $\beta = 1.942, p < 0.05$; $\beta = 2.154, p < 0.01$), Table 1. Accordingly, H1, information literacy reveals significant correlations with lifelong learning, is supported.

From Table 2, the first regression tests the effect of lifelong learning on administrative performance, appearing the positive influence of cognition, skills, and affection on administrative performance ($\beta = 2.166, p < 0.01$; $\beta = 2.275, p < 0.01$; $\beta = 2.438, p < 0.01$). The second regression tests the effect of lifelong learning on teachers' teaching quality, showing the remarkably positive influence of cognition, skills, and affection on teachers' teaching quality ($\beta = 2.362, p < 0.01$; $\beta = 2.183, p < 0.01$; $\beta = 2.397, p < 0.01$). The third regression tests the effect of lifelong learning on students' learning performance, presenting the notably positive influence of cognition, skills, and affection on students' learning performance ($\beta = 2.346, p < 0.01$; $\beta = 2.197, p < 0.01$; $\beta = 2.633, p < 0.01$), Table 2. As a result, H2, affection shows notable correlations with school effectiveness, is supported.

Table 2. Regression Analysis of lifelong learning and school effectiveness

Dependent variable Independent variable ↓	School effectiveness					
	Administrative performance		Teachers' teaching quality		Students' learning performance	
	β	P	β	P	β	P
Cognition	2.166**	0.000	2.362**	0.000	2.346**	0.000
Skills	2.275**	0.000	2.183**	0.000	2.197**	0.000
Affection	2.438**	0.000	2.397**	0.000	2.633**	0.000
F	18.664		23.735		28.561	
R ²	0.203		0.239		0.264	
Adjusted R ²	0.116		0.134		0.168	

* $p < 0.05$ ** $p < 0.01$

Data source: Self-organized in this study

From Table 3, the first regression tests the effect of information literacy on administrative performance, appearing the positive influence of information perception, information selection, information utilization, and information evaluation on administrative performance ($\beta = 2.122, p < 0.01$; $\beta = 1.845, p < 0.05$; $\beta = 2.238, p < 0.01$; $\beta = 1.946, p < 0.05$). The second regression tests the effect of information literacy on teachers' teaching quality, presenting the significantly

Table 3. Regression Analysis of information literacy and school effectiveness

Dependent variable Independent variable ↓	School effectiveness					
	Administrative performance		Teachers teaching quality		Students learning performance	
	β	P	β	P	β	P
Information perception	2.122**	0.000	2.251**	0.000	1.987*	0.010
Information selection	1.845*	0.015	2.082**	0.000	2.134**	0.000
Information utilization	2.238**	0.000	2.176**	0.000	2.283**	0.000
information evaluation	1.946*	0.012	2.117**	0.000	2.425**	0.000
F	21.533		23.746		29.237	
R ²	0.269		0.293		0.322	
Adjusted R ²	0.171		0.189		0.217	

* $p < 0.05$ ** $p < 0.01$ Data source: Self-organized in this study

positive influence of information perception, information selection, information utilization, and information evaluation on teachers' teaching quality ($\beta=2.251$, $p<0.01$; $\beta=2.082$, $p<0.01$; $\beta=2.176$, $p<0.01$; $\beta=2.117$, $p<0.01$). The third regression tests the effect of information literacy on students' learning performance, revealing the remarkably positive influence of information perception, information selection, information utilization, and information evaluation on students' learning performance ($\beta=1.987$, $p<0.05$; $\beta=2.134$, $p<0.01$; $\beta=2.283$, $p<0.01$; $\beta=2.425$, $p<0.01$), Table 3. Consequently, H3, information literacy appears notable correlations with school effectiveness, is supported.

CONCLUSIONS

The empirical results in this study show the significant correlations between teachers' information literacy and lifelong learning, between lifelong learning and school effectiveness, and between information literacy and school effectiveness. The effect of lifelong learning is apparent. The results reveal the higher teachers' information literacy, the better teaching efficacy. In such an era when information technology is emphasized, administrative institutes have stressed on the cultivation of teachers' information literacy abilities. Nevertheless, regular in-service training should be held for teachers presenting abilities to create supportive instructional environments and effectively promoting the teaching efficacy so as to enhance students' learning progress. This study could also help educational sectors realize more of current situations and discover the encountered problems and challenges, based on which the suggestions are proposed. This study contributes to academic research and presents certain value of practical reference. Summing up the results and findings, the following practical suggestions are further proposed.

1. To establish teachers' information literacy key indicators and testing: Teachers' information literacy indicators could have teachers at different levels judge the personal conditions of information literacy and adjust the learning methods and contents. In this case, the establishment of indicators is related to the direction of the information education. Formulating teachers' information literacy key indicators therefore allow teachers setting goals with the reference standard of indicators to indirectly enhance the information literacy.

2. To encourage studies or hold various courses to enhance the competence: A school should encourage teachers learning for higher degrees or hold various courses to enhance the competence so as to promote teachers' information literacy and induce the instructional creativity. A school has to become a learning organization to conform to the trend in the approach era of lifelong learning.

3. To increase teachers' administrative opportunities by position rotation: When arranging administrative work, suitable teachers are selected and home teachers and professional teachers are adjusted the positions so that all teachers in the school are able to do administrative work or home teachers, expand the opportunities to participate in school affairs, and increase experiences and opportunities so as to enhance teachers' information literacy abilities.

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