Research on Self-Efficacy of Distance Learning and its Influence to Learners' Attainments

Jianwei Zhang, Fei Li, Chongjiang Duan, Gengsheng Wu

Educational Technology Center, Tsinghua University, Beiijng, China

Abstract

Up to date, some studies have explored learners' characteristics in Distance Learning (DL) and found that certain characteristics lend to a better distance learner. The present study investigated learners' self-efficacy beliefs of DL, attainments in DL, and the relations to learners' characteristics. In the results, the students displayed relatively positive DL self-efficacy, which was closely related to their intrinsic motivation and Self-Regulated Learning (SRL) skills. The students perceived to have attained much in most of the spheres of learning objectives. DL self-efficacy, SRL skills, and computing skills were proved to be the important predictors of learners' overall attainments in DL. Significant gender differences were observed on both DL self-efficacy and DL attainmen. All the factors need to be taken into account to design supportive, adaptive, and effective DL systems.

Keywords: Distance Learning, Web-based learning, self-efficacy of Distance Learning, self-regulated learning

1 Introduction

DL is more than 150 years old and has been a practical option for many students and institutions, but the advances in Information and Communication Technology (ICT) has accelerated interest in DL to an unprecedented degree. DL is becoming a mainstream instructional delivery system for post-secondary courses and degree programs (Selingo, 1998). In China, the Distance Education had been confined within Radio and TV Universities over the last two decades, until Tsinghua University established its Distance Education system based on Web as well as Digital Video Broadcasting (DVB) and CATV

technology in 1997. Thereafter, thirty-eight regular universities of high quality in China have been approved to establish web schools to offer DL programs so far. Many higher education institutions are adopting distance and online learning as the next logical step in educational delivery systems. However, as O'Malley & McCraw (1999) documented, the effectiveness of distance and online learning and its impacts on students' learning have not been well researched prior to adoption. Hence, a series of investigations have been carried out by our institution to investigate how learners deal with DL and the resulted effectiveness. The present study focuses on the influence of learners' characteristics (esp. self-efficacy beliefs about DL) on their attainments in DL.

1.1 Studies on learners in DL: A brief review

Up to date, some studies have investigated learners' characteristics in DL and found that certain characteristics lend to a better distance learner. Buchanan (1999) asserted that Web-based environment requires certain qualities and learning styles: learners need to be mature, self-directed, self-disciplined, computer literate, and particularly have the ability to collaborate and communicate with others. In the studies investigating factors influencing students' achievement, Oxford et al. (1993) found that motivation was the best predictor of student achievement in learning the Japanese language through the medium of satellite television. Shih & Gamon (1999) examined the relationships of student learning styles, motivation, learning strategies, and achievement in Web-based courses. Roblyer (1999)'s study demonstrated that for students who chose DL, control over Face and timing of learning was more important; for students who chose FTF courses, interaction with instructor and students was paramount. When looking at students' view of distance education compared to traditional instruction, Klesius et al., (1997) concluded that distance education is more likely to be perceived positively when students need the course content, enjoy little or no travel to the instruction site, and are intrinsically motivated. In some other studies, students' ability to structure one's own learning (Hardy & Boaz, 1997), goal-centeredness (Laube, 1992), procrastination levels (Wilkinson & Sherman, 1990), intrinsic motivation (being motivated by the curiosity and demand of knowledge rather than by external reinforcement)(Dill & Mezach, 1991; Coussement, 1995), and previous experience with technology (Richards & Ridley, 1997) were found to be significant determiners of persistence and achievement in DL.

Except for the learners' characteristics addressed in the above studies, self-efficacy, which refers to one's convictions to perform successfully at designated levels (Schunk, 1991), might be of great importance in DL. Ample evidence accrued during the past two decades demonstrates the strong and positive influence of efficacy beliefs on various aspects of student motivation and achievement (see Joo et al., 2000). As far as the effect of self-efficacy on Computer-Based Learning is concerned, Hill & Hannafin (1997) found that learners' computer self-efficacy had notable effect on their information searching processes. Levine & Donitsa-Schmidt (1998) found that as subjects expressed stronger computer confidence, they also demonstrated more positive attitudes toward computers and higher

levels of computer-related knowledge. Joo et al. (2000) investigated the influence of self-efficacy for self-regulated learning, academic self-efficacy, and Internet self-efficacy on learners' performance in Web-Based Instruction. The study maintained that computer self-efficacy is one of the critical variables determining the success of CBL and WBI. DL is such a distinct format of learning activity in that students and teachers are separated by distance (geographical, temporal, contextual) and technology is used to lessen or eliminate the distance barrier. Can DL be as effective as face to face (FTF) instruction? Can a learner learn successfully through DL? Could he/she make better, or at least the same achievement in DL as in traditional learning? The learners' self-efficacy beliefs about DL itself might be of particular importance in this circumstance. Among the few studies related to self-efficacy of DL, O'Malley & McCraw (1999) found that students generally don't perceive that DL is as effective as traditional methodologies, but DL has some relative advantages such as working well with their schedules and saving time. More studies need to be conducted to investigate DL self-efficacy as well as its influence upon learners' attainments in DL.

1.2 Purpose of the study

The purpose of the study was to explore learners' self-efficacy beliefs of DL, attainments in DL, and the relations to learners' characteristics. The specific questions were: (1) How do the students believe that DL is effective and they can learn successfully via DL? The self-efficacy beliefs may have gender difference and might be influenced by learners' experiences with DL, hence learners' gender and grade that represents their experiences of DL will be included as between-subject factors. (2) How is self-efficacy of DL related to learners' such characteristics as intrinsic motivation, Self-Regulated Learning (SRL) skills, and computing skills? As we can see from the literature review, these learner variables might play important roles in DL. (3) How do students evaluate their attainment in DL and how is the attainment related to their self-efficacy of DL and other characteristics?

2 Methodology

2.1 Subject

The subjects were 112 students who enrolled in Tsinghua University's distance learning programs, including such graduate programs as computer application, business management, civil law, and undergraduate programs like economics, law, and English. 65.4% of the students were freshmen who enrolled in 2000, and the left 34.6% started DL from 1998 or 1999 and have 1-2 years of DL experiences. 32.7% of the students were female and 67.3% were male. They had an average age of 30 ranging from 21 to 39 years old. Most students had full-time jobs with average level of incomes.

2.2 Instrument

The survey instrument designed based on relevant researches and existing measures consisted of three parts: (a) Questions on students' personal demographic and educational characteristics (e.g. age, gender, grade); (b) Six-point Likert-type scales designed to examine learners' intrinsic motivation (5 items), SRL skills (11 items), and computing skills (5 items). Students were requested to demonstrate the extent on which they agreed with a statement (1=strongly disagree to 6=strongly agree); (c) An 8-item six-point Likert scale designed to measure learners' the self-efficacy of DL. (d) A four-point Likert scale requesting learners to indicate their perceived attainment in DL from 9 spheres, which will be elaborated in the results. The perceived attainment was chosen as the indicator of the effectiveness of DL because it is difficult to evaluate the multi-facets outcomes of DL, and also the perceived attainment *per se* is of great importance in evaluating DL. The researchers developed a list of constructs to be measured before composing the items. A review committee reviewed the final draft of the measures and revised some of the items. All the procedures were adopted to establish the construct validity for the instrument.

2.3 Procedure

The survey was administered at the end of a semester in 2000. The students were told to review and

reflect over their distance learning by completing the questionnaires in paper format. 112 of the 124 questionnaires were handed in, with a return rate of 90%. The responses of the subjects were then coded according to the developed coding system. SPSS V9.0 was used to conduct all the statistical analysis.

3 Results

3.1 The self-efficacy of DL

Table 1 shows students' responses to the items of DL self-efficacy scale. The overall DL self-efficacy among students of different genders and grades were depicted in Table 2. Their beliefs about the effectiveness of DL were relatively positive with an average rating of 3.94 on the six-point scale (1=strongly disagree to 6=strongly agree). The ANOVA using gender and grade as between subject factors manifested that gender had significant main effect on the self-efficacy of DL ($F(1,100)=16.97$, $p=.000$), indicating that male students had more positive beliefs than female. Grade had a marginally significant effect ($F(1,100)=3.33$, $p=.071$), showing that freshmen (grade 2000) had more positive beliefs than student with one or two years of DL experience (grade 1998/1999). Significant interaction was found for gender and grade ($F(1, 100)=8.29$, $p=.005$) (see Figure 1). Simple effect analysis revealed that gender had significant effect among 1998/1999 students ($F(1,101)=15.02$, $p=.000$), whilst had no significant effect among freshmen ($p>.10$).

| Items	Strongly disagree 1	2	3	4	5	Strongly agree 6
I feel that there is no way to learn successfully in DL courses.	23.4	23.4	34.2	14.4	4.5	.0
The DL methodology restrains me from learning effectively.	8.3	19.3	37.6	22.0	9.2	3.7
I will encourage my colleague to register DL courses.	2.7	8.0	13.4	38.4	25.0	12.5
I regret that I've chosen DL.	34.2	26.1	25.2	9.9	1.8	2.7
I believe that I can learn as much as in face-to-face courses.	1.8	6.4	19.1	49.1	16.4	7.3
I believe that I can learn as good as in	4.5	8.1	21.6	45.0	14.4	6.3

face-to-face courses.

| | .9 | .0 | 8.0 | 20.5 | 33.9 | 36.6 |
I should have learned better if the courses had been in face-to-face format.

| I like the DL courses very much. | .9 | .9 | 14.4 | 47.7 | 23.4 | 12.6 |

Table 1: Students' responses to the items of DL self-efficacy scale (%)

| Groups | | Self-efficacy of DL | |
		M	SD
Female	1998/1999	3.20	.74
	2000	3.86	.60
Male	1998/1999	4.18	.51
	2000	4.03	.68
	Total	3.94	.68

Table 2: The self-efficacy of DL among different groups
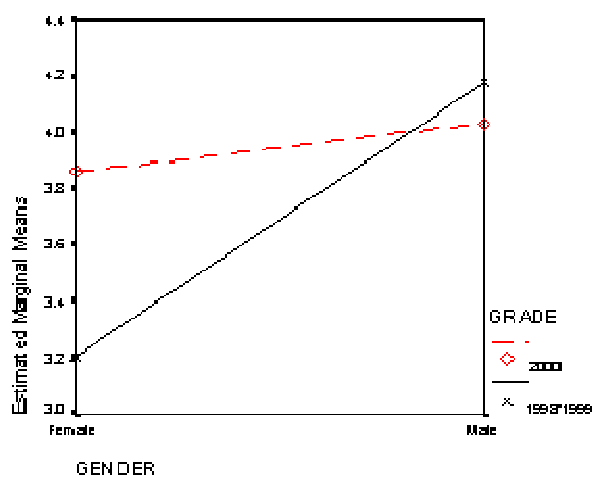
Figure 1: The interaction of grade and gender on self-efficacy of DL

3.2 The correlation between learners' characteristics and self-efficacy of DL

Correlation analysis was conducted to examine the relationships between the learners' intrinsic motivation, SRL skills, computing skills and the self-efficacy of DL (see Table 3, *p<.05, **p<.01). The self-efficacy of DL was found to be significantly correlated to learners' intrinsic motivation and SRL skills.

	Intrinsic motivation	SRL skills	Computing skills
Self-efficacy of DL	.346**	.295**	.149

Table 3: Correlation between self-efficacy of DL and learners' characteristics (Person r)

Significant correlation was also observed between learners' intrinsic motivation and computing skills (Pearson r=.285**). Therefore, in order to make clear the pattern of the relationships among self-efficacy of DL and the learner characteristics, we performed linear regression analysis with enter method using intrinsic motivation, SRL skills and computing skills as predictors. Intrinsic motivation and SRL skill indicated significant effect on self-efficacy of DL (see Table 4).

Model	Standardized Beta	t	Sig.
1(constant)		2.024	.046
Intrinsic motivation	.303	3.172	.002
SRL skill	.250	2.699	.008

| Computing skill | .019 | .200 | .842 |

Table 4: The regression effect of learners' characteristics on self-efficacy of DL

3.3 Learners' attainment in DL

How do students perceive their attainments in DL? Figure 2 shows learners' reported attainments in nine spheres on four-point scale (1=exstremely little, to 4= extremely much). The nine spheres are: (1) memorization of basic facts and concepts; (2) basic skills; (3) conceptual understandings; (4) knowledge integration; (5) application and problem solving; (6) creative/critical thinking; (7) communication with others; (8) skills for information access and independent learning; (9) academic research abilities. The students perceived to have benefited much in most of the spheres, with a mean rank of 2.77. They seemed to have benefited much more in conceptual understandings of knowledge and independent learning abilities, whilst little in the ability to do research.
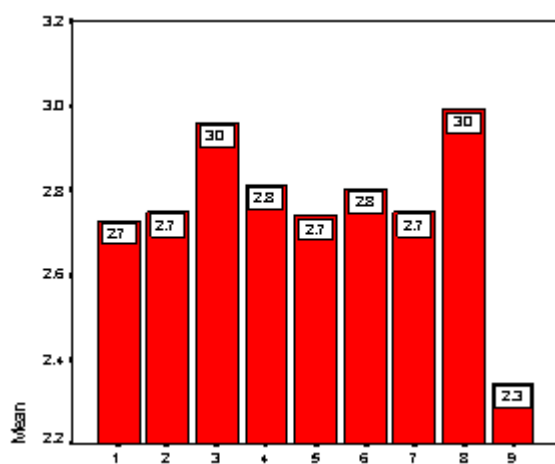
Figure 2: Learners' attainments in DL in different spheres

	Groups	Overall attainments in DL	
		M	**SD**
Female	1998/1999	2.73	.27
	2000	2.66	.40
Male	1998/1999	3.04	.28
	2000	2.69	.42
	Total	2.77	.40

Table 5: The DL attainments on four-point scale

MNOVA manifested that gender $(F(1,101)=4.456, p=.037)$ and grade $(F(1, 101)=6.73, p=.011)$ had significant main effects on overall attainments in DL. A marginally significant interaction was also observed for the two factors $(F(1,101)=3.018, p=.085)$, indicating that among the students with one or two years of DL experiences, male students tended to report higher attainments than female.

3.4 Regression analysis of the learner characteristics on DL attainments

Regression analysis was performed to clarify the influences of the learner variables including self-efficacy of DL, intrinsic motivation, SRL skills, and computing skills on the DL attainments. Significant effects were observed for DL self-efficacy $(p<.05)$, SRL skills $(p<.001)$, with a marginally significant effect for computing skills $(p<.10)$.

Model	Standardized Beta	t	Sig.

1(constant)		3.913	.000
Self-efficacy of DL	.245	2.589	.011
Intrinsic motivation	-.123	-1.303	.196
SRL skills	.360	3.983	.000
Computing skills	.165	1.824	.071

Table 6: Regression analysis of the learner characteristics on DL attainment

4 Discussion

The study indicated that the students hold relatively positive efficacy beliefs about DL with an average rating of 3.94 on the six-point Likert scale. About 2/3 of the learners believe that they can learn as good and much as in traditional FTF courses. On the DL attainment scale, students reported to have benefited much in most of the spheres, with a mean rank of 2.77 on the four-point scale. Significant gender difference was found on the self-efficacy of DL as well as the DL attainments, showing that male students had more positive beliefs and reported greater attainments than female. This seems inconsistent with Ross & Powell (1990)'s finding that women have a higher success rate in DL than men. Grade had a marginally significant effect on DL self-efficacy, showing that freshmen had more positive beliefs than students with one or two years of DL experiences. This might be explained by the decrease in the novelty of DL as their experiences accumulated. Actually, as we can see from the DL attainment analysis, students tended to report greater attainments as they proceeded with DL. Notable interaction was found for gender and grade on self-efficacy of DL and DL attainments, revealing that gender manifested more significant effects among students with one or two years of DL experiences.

As far as the relationship between learners' characteristics and DL self-efficacy is concerned, learners' intrinsic motivation and SRL skills were found to be closely related to self-efficacy of DL. Learners with higher intrinsic motivation and SRL skills tended to have more positive beliefs in the effectiveness of DL. This concurs with the results of the studies by Klesius et al., (1997) and Hardy & Boaz (1997). Motivated by the curiosity and demand of knowledge rather than by external reinforcements, learners could be involved in DL more deeply hence experience and enjoy the knowledge acquisition processes to a greater extent. Also, with higher SRL abilities, learners could structure and manage their learning more effectively and gain higher confidence in accomplishing DL tasks.

When it comes to the relationships between DL attainments and learners' DL self-efficacy as well as other characteristics, significant regression effects were observed for self-efficacy of DL, SRL skills, with a marginally significant effect for computing skills. As was emphasized by Joo et al. (2000), learners' self-efficacy beliefs have strong and positive influence on their learning achievement. The self-efficacy of DL *per se* plays a prominent role in DL processes and deserves further attentions and

explorations in both research and practice. Besides, in distance learning environment, learners need to be mature, self-directed, and self-disciplined (Buchanan, 1999). Hence learners' SRL skills demonstrated consistent positive effect on DL in this study. Facilitative learning supports should be provided to promote students' self-regulated learning when designing DL systems. As is congruent with the earlier studies (Buchanan, 1999; Hill & Hannafin, 1997; Levine & Donitsa-Schmidt, 1998; Joo et al., 2000), computing skills display notable influence to DL because the learning activities rely on learners' using of computer technologies to access information resources, complete assignments and communication with institutions, tutors, and peers. Effective technological supports and services need also be included in the DL system designs.

5 Conclusions

In conclusion, the students displayed relatively positive DL self-efficacy, which was closely related to their intrinsic motivation and Self-Regulated Learning (SRL) skills. The students perceived to have attained much in most of the spheres of learning objectives. DL self-efficacy, SRL skills, and computing skills were proved to be the important predictors of learners' overall attainments in DL. Significant gender differences were observed on both self-efficacy of DL and DL attainment, indicating that male students had more positive beliefs and higher attainments in DL. All the factors need to be taken into account to design supportive, adaptive, and effective DL systems.

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