Self-efficacy: a concept closely linked to information literacy and lifelong learning

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Abstract *This paper is primarily concerned with self-efficacy in the context of information literacy. The focus is first on the concept of self-efficacy, followed by attainment of self-efficacy beliefs. Finally, findings of the research, the aim of which was to explore students' (who enrolled in the Department of Information Management, Hacettepe University, Ankara, Turkey) perceived self-efficacy for information and computer literacy, are scrutinized. Results of the research indicate no significant year-to-year changes, although the students have a positive perceived self-efficacy for information literacy. Students' self-efficacy beliefs regarding information literacy and computers are correlated.*

Introduction

The most salient characteristic of today's societies is that they are in a constantly changing process. While the amount of information increases, technology gains momentum and the use of technology gradually becomes widespread. There is no occupation today, which hasn't been affected by these changes. It is almost obligatory for any individual who has completed his/her formal education to become acquainted with these new developments.

Societies of the information age need confident, independent, self-regulated learners equipped for lifelong learning. Hence, the manpower needed by today's societies can be described as effective consumers of information who can find, evaluate, use, produce and share information and can also make use of technology in all these activities.

Self-regulated learning and information literacy are keystones of lifelong learning. An information literate individual knows how to learn and is capable to achieve lifelong learning. Information literacy[1] is the term being applied to the skills of information problem solving (American Library Association, 2000). Computer literacy, a general understanding of what computers can do, and the skills necessary to use them as an effective tool (Tuckett, 1989, as cited in Bawden, 2001), is a part and prerequisite of information literacy. Computers are important tools for learning, problem solving, communicating and retrieving

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information. The use of computer technologies has become inevitable for almost all the professions in the modern societies. Hence, information and computer literacy skills have become the necessary intellectual ingredient of an individual's life.

Individuals must feel confident and competent in using certain technologies and skills in order to employ them effectively. According to Bandura (1977), learning certain skills is not enough, individuals should also develop confidence in the skills that they are learning. In other words, success is not simply based on the possession of necessary skills for performance, it also requires the confidence to use these skills effectively. Therefore, apart from possession of information and computer literacy skills, individuals of today's society must also feel confident and competent in the use of these skills.

Information professionals who undertake the responsibility of offering information services and teaching information literacy skills, should have high sense of efficacy both in information and computer literacy which directly and strongly is bound to affect the success of their work performance. Furthermore, helping information professionals to improve their self-efficacy beliefs during their education, prior to graduation, becomes as important as equipping them with necessary skills and knowledge.

This paper is primarily concerned with self-efficacy in the context of information literacy. Firstly, the focus will be on the concept of self-efficacy, followed by attainment of self-efficacy beliefs. Finally, the findings of the research conducted to explore students', who enrolled in the Department of Information Management Hacettepe University, perceived self-efficacy for information literacy and computer literacy will be scrutinized.

Self-efficacy

The concept of self-efficacy, key element of "social learning theory", has been developed primarily in the discipline of social physcology by Bandura (Bandura, 1977, 1986, 1994, 1995, 1997; Pajares, 2002; Zimmerman, 1995; Schunk, 1985). Self-efficacy refers to a belief in one's ability to successfully perform a particular task. Bandura (1997) defines self-efficacy as a belief in one's own capabilities to organize and execute the course of action required to attain a goal. Perceived self-efficacy, on the other hand, refers to an identified level and strength of self-efficacy (Kear, 2000). The strength of self-efficacy is measured by degrees of certainty that one can perform given tasks (Zimmerman, 1995). Within the construct of perceived self-efficacy, the motivation of behavior is one's belief in the capability to perform an act (Bandura, 1997).

Because self-efficacy is based on self-perceptions regarding particular behaviors, the construct is considered to be situation specific or domain sensitive. That is, an individual may exhibit high levels of self-efficacy within one domain while exhibiting low levels within another domain (Cassidy and

Eachus, 1998?). Hence, self-efficacy has generated research in areas as diverse as medicine, business, psychology and education (Kear, 2000; O'Leary, 1985; Lev, 1997; Schunk, 1985; Koul and Rubba, 1999). Computer self-efficacy, for instance, is a field which has attracted several researchers from a variety of disciplines (Delcourt and Kinzie, 1993; Karsten and Roth, 1998; Compeau and Higgins, 1995; Hill *et al.*, 1987; Geer *et al.*, 1998).

Although there exists a large body of literature related to computer self-efficacy, those mentioning self-efficacy in the context of information literacy are few in number. Literature on the information literacy, which generally focuses on what makes an individual information literate, is growing and there is no sign that this trend will slow down in the near future. However, as Neely (2002) has indicated sociological and psychological factors involved in the development of an information literate individual are neglected. Perceived self-efficacy can be accepted as one of the psychological factors which has an impact on information literacy. A link between these two concepts is mentioned by Geer *et al.* (1998) in the study they carried out on computer self-efficacy. Grassian and Kaplowitz (2001) briefly mentioned the self-efficacy concept in their book, the subject of which is information literacy instruction. There also exist some research on measuring the self-efficacy of school library media specialists (Carson, 1993), perceived self-efficacy and success of Internet learners (Nahl, 1996), pre-service teachers' self-efficacy for information technology (Watson, 1997), self-efficacy and the search for government information (Ren, 1999). However, no research regarding to perceived self-efficacy for all aspects of information literacy was found in the literature.

Sources of self-efficacy beliefs

There is a close link between attitudes and experience, and the attainment of self-efficacy. Research by Bandura (1986) shows that efficacy perceptions develop from a gradual attainment of skills and experience over time.

Self-efficacy beliefs are influenced by a number of factors. According to Bandura self-knowledge about one's efficacy is based on four principal sources of information: "mastery experiences" (previous experience – success and failure); "vicarious experiences" of observing the performances – successes and failures – of others; "social persuasion" (verbal persuasion from peers, colleagues, relatives); and "physiological and emotional states" from which people partly judge their capableness, strenght, and vulnerability to dysfunction. (Bandura, 1986, 1994, 1995; Koul and Rubba, 1999; Cassidy and Eachus, 1998; Pajares, 2002)

Individuals form their self-efficacy beliefs by interpreting information primarily from their previous experience. Individuals interpret the results of their actions and use the interpretations to develop beliefs about their capabilities to engage in subsequent activities (Bandura, 1994, 1995; Pajares, 2002; Koul and Rubba, 1999) Typically, successes raise self-efficacy while

failures lower it. On the other hand, as Bandura (1986) indicates, after a strong sense of self-efficacy is developed through repeated successes, occasional failures do not effect it easily.

In addition to "mastery experience", self-efficacy appraisals are partly influenced by "vicarious experience" of observing others perform tasks. The influence of the vicarious experiences on self-efficacy beliefs is weaker than the mastery experience. Individuals become especially sensitive to vicarious experience when they have had insufficient familiarity with the task in their hands. Vicarious experience is particularly powerful when observers see similarities between themselves and the model. Observing the successes of such models contributes to the observers' beliefs about their own capabilities. On the contrary, faliures of such models can undermine the observers' beliefs about their own capability to succeed (Bandura, 1986, 1995; Pajares, 2002).

"Verbal persuasion" which individuals receive from others can also contribute to the development of self-efficacy beliefs. Positive persuations may empower, negative persuations may weaken self-efficacy beliefs. People who are persuaded verbally that they possess the capabilities to master given tasks are likely put more effort when difficulties arise. It is usually more difficult to strengthen self-efficacy beliefs through positive encouragement than to weaken it through negative appraisals (Bandura, 1986, 1995; Pajares, 2002).

"Physiological state" also influence self-efficacy beliefs. People gauge their degree of confidence by the emotional state they experience as they contemplate an action. Strong negative emotional reactions, such as anxiety, stress, and fear can lower self-efficacy perceptions (Bandura, 1986, 1995; Pajares, 2002).

Why self-efficacy is important

Self-efficacy beliefs influence people's thought patterns, emotions and actions; in other words, they influence the totality of human behavior (Koul and Rubba, 1999; Cassidy and Eachus, 1998). Self-efficacy beliefs provide the foundation for human motivation, well-being, and personal accomplishment. People have little incentive to act or to persevere in the face of difficulties unless they believe that their actions can produce the outcomes they desire (Pajares, 2002). As Bandura (1977, 1986) has indicated people tend to avoid tasks and situations which they believe exceed their capabilities, but nevertheless they undertake and perform activities they judge themselves capable of handling.

Self-efficacy is a critical determinant of self-regulation that is a key component of lifelong learning. Bandura underlines that students who develop a strong sense of self-efficacy are well equipped to educate themselves when they have to rely on their own initiative (Bandura, 1986). As a conclusion strong self-efficacy perception is essential not only for self-regulation but also for information literacy to accomplish lifelong learning.

Self-efficacy is a factor that influences human functioning. Although the knowledge and skills they possess play critical roles on the choices people make and the courses of action they pursue, Bandura (1997) has indicated that people's level of motivation, affective states, and actions are based more on what they believe than on what is objectively true. Individuals tend to select tasks and activities in which they feel competent and confident and avoid those in which they do not (Kear, 2000; Pajares, 2002). That is one reason why self-efficacy is so important for lifelong learning. If individuals feel themselves competent and confident about their information literacy skills they will be willingly undertake information problem solving activities and they will easily become self-regulated learners. Otherwise it is more likely that they will avoid and hesitate to try solving information problems which pass their desk. Because high level of self-efficacy leads to a desire and willingness to act and to risk trying a new behavior, it becomes important for the use of information literacy skills for lifelong learning.

Self-efficacy beliefs also help determine how much effort individuals will expend on an activity, how long they will persevere when confronting obstacles, and how resilient they will be in the face of adverse situations. Individuals with a positive self-efficacy expect to succeed and will persevere in an activity until the task is completed. On the other hand, individuals with low perception of self-efficacy anticipate failure and are less likely to attempt or persist in challenging activities. The higher the sense of efficacy, the greater the effort, persistence, and resilience (Pajares, 2002; Kear, 2000). Persistence and resilience are two factors crucial for information problem solving, self-regulated learning and lifelong learning.

A research on students' perceived self-efficacy for information and computer literacy

In this paper, the results of a survey undertaken at the Department of Information Management, Hacettepe University, Ankara, Turkey, is described. The student body participating in the survey was composed of 179 undergraduates (40 first-year, 29 second-year, 62 third-year and 48 fourth-year students) selected randomly. What percentage of each segment of the population responded the survey is shown in Table I.

	N	*n*	Response rate (%)
First year	68	40	58.8
Second year	54	29	53.7
Third year	120	62	51.7
Fourth year	75	48	64.0
General total	317	179	56.5

Table I.
Subjects' response rates

The aim of the study was to explore students' perceived self-efficacy in Information and computer literacy and ascertain any possible correlation if any between these perceptions. Any possible year-to-year changes in the level and strength of students' self-efficacy beliefs were also investigated.

Methodology and data collection

In an effort to collect the necessary data two different self-efficacy scales were used. To assess students' perceived self-efficacy for information literacy an 89-item self-efficacy scale, the reliability of which is 0.78, was used. Respondents were required to indicate their level of efficacy at each item along a five-point Likert scale. Statements[2] on the scale were classified in nine main categories:

(1) defining the need for information;
(2) initiating the search strategy;
(3) locating and accessing the resources;
(4) assessing and comprehending the information;
(5) interpreting, synthesizing, and using the information;
(6) communicating the information;
(7) evaluating the product and process;
(8) revising, improving, and updating self-generated knowledge; and
(9) recognizing and respecting the principles of intellectual freedom and the equitable access to information.

This scale was originally developed by Akkoyunlu and Kurbanoglu (2003).

In order to assess student's perceived computer self-efficacy an 18-item self-efficacy scale developed by Askar and Umay (2001) was used. Subjects were asked to rate their level of confidence for computer related issues on a five-point Likert scale, reliability of which is 0.70. Since the statements used were general, such as "I feel myself confident and competent with computers", and "I feel confident when I come across problems while I am using computers", rather than being specific regarding to different computer applications, no further classification was used as a part of this scale.

The responses were given according to the following criteria: always = 5, usually = 4, sometimes = 3, rarely = 2 and never = 1. For the evaluation a mean of 4.50 to 5.00 indicates always; 3.50 to 4.49 indicates usually; 2.50 to 3.49 indicates sometimes; 1.50 to 2.49 indicates rarely; and less than 1.50 indicates never.

Results and discussion

The subjects' perceived self-efficacy for information literacy

Results of the survey showed that students enrolled in the Department of Information Management have a positive perceived self-efficacy for

information literacy, scoring 3.65 (usually). This can be interpreted as the students of the Information Management Department feeling efficacious about performing information literacy related tasks. According to the mean scores for classes first-year students had the lowest score (3.46) which indicates the sometimes level on the scale. All the rest had scores indicating usually level (Table II).

The results suggest that the level of students' perceived self-efficacy for information literacy increases slightly through the years; and the highest level is acquired in the third year of university education while a slight decrease is detected in the final year. Students' self-efficacy beliefs regarding to information problem solving activities change from feeling sometimes efficacious to usually efficacious, after they complete their first year at the Department. However, contrary to what has been expected there is not much difference between the self-efficacy beliefs of second-year, third-year and final-year students. One conclusion that can be drawn from these results that the level of self-efficacy acquired by the students in their second year of education does not change significantly on the following years. This was unexpected because these students had ample opportunity to increase their scores because of their involvement in practical training, preparing research papers and other curricular activities[3].

The results indicate that the students need more practice to gain the necessary experience in the positive direction. The reverse is true for the negatively oriented experience. Hence, the students should be given the opportunity of acquiring more practice, and the measures should be taken to turn the results of these practices into positive developments. The students should be given feedback on their shortcomings or mistakes, and they should be given a chance to correct them. Only in this way the students can acquire positive experiences and these experiences, in turn, can affect their perceived self-efficacy in the positive way.

In addition to this general evaluations the subjects' self-efficacy beliefs for information literacy was further examined in detail according to nine major categories (Table III). Third- and final-year students' scores, although they seemed different for each category, were not significantly different when evaluated on the Likert scale. On the other hand, first-year students presented higher self-efficacy beliefs for certain categories, such as defining the

	n	$\bar{X}$	SD
First year	40	3.46	0.37
Second year	29	3.52	0.67
Third year	62	3.78	0.41
Fourth year	48	3.72	0.44
General total	179	3.65	0.48

Table II.
Subjects' perceived self-efficacy for information literacy

	First year		Second year		Third year		Fourth year		Total	
	X	SD	*X*	SD	*X*	SD	*X*	SD	*X*	SD
Defining the need for information	3.88	0.58	3.98	0.01	3.77	0.39	3.88	0.28	3.85	0.38
Initiating the search strategy	3.84	0.34	3.98	0.58	3.76	0.40	3.82	0.39	3.85	0.39
Locating and accessing the resources	3.56	0.36	3.76	0.93	3.78	0.42	3.80	0.45	3.73	0.42
Assessing and comprehending the information	3.57	0.34	3.65	0.45	3.86	0.38	3.80	0.23	3.72	0.38
Interpreting, synthesizing, and using the information	3.54	0.35	3.45	0.56	3.78	0.38	3.69	0.56	3.62	0.36
Communicating information	3.26	0.29	3.45	0.47	3.85	0.41	3.67	0.42	3.56	0.42
Evaluating the product and process	3.22	0.26	3.23	0.83	3.80	0.43	3.62	0.34	3.47	0.34
Revising, improving, and updating self-generated knowledge	3.24	0.37	3.20	0.45	3.78	0.44	3.60	0.45	3.45	0.53
Recognizing the principles of intellectual freedom and equitable access to information	3.01	0.45	3.00	0.62	3.65	0.48	3.60	0.34	3.32	0.46
General total	3.46	0.37	3.52	0.67	3.78	0.41	3.72	0.44	3.65	0.48

Table III.
Subjects' mean scores for different aspects of information literacy

information need, initiating search strategies, locating and accessing the information sources, assessing and comprehending the information and interpreting, synthesizing, and using the information, than the other categories. The same is true for the second-year students. Communicating the information (i.e. choosing a format appropriate for audience and purpose, creating an original product, providing appropriate documentation), evaluating the product and process' (i.e. determining how well the final product resolved the information problem and how appropriate the steps taken to reach the desired outcome), improving self-generated knowledge, and recognizing the principles of equitable access to information (i.e. sharing access to limited resources, respecting others' rights) are the categories the levels of which the students' self-efficacy beliefs are weaker on their first two years.

The results of the survey showed that students' perceived self-efficacy for certain aspects of information literacy indicated no significant difference through the four years while a difference (one level increase) was detected for the rest; especially after the students completed their second year at the department.

As Pajares (2002) indicates, belief and reality do not always perfectly match. On one hand, talented people may suffer from self-doubt about capabilities they possess, on the other hand, despite possessing a modest repertoire of skills people may be confident about what they can accomplish. It is not unusual for individuals to over- or under-estimate their abilities. Consequently, there might be a gap between students' perceived self-efficacy and their actual competence. Detecting no significant increase on subjects' self-efficacy beliefs through the years does not mean that there is no difference in their actual knowledge and competence.

The subjects' computer self-efficacy

The mean scores of students participating in the survey are shown in Table IV. The general mean score of students for computer self-efficacy was 2.63, which indicates that the students regard themselves as sometimes efficacious and confident in the computer-related tasks. However, a higher score was expected since computer literacy instruction and information technologies are vital part of their curriculum and training programs[4]. The highest scores were achieved by the second-year students (2.70) and the lowest by first-year students (2.50). However, although scores were different from each other, on the Likert scale they were all in the sometimes category, indicating no significant differences.

Such a finding doesn't mean that the students lack the necessary knowledge, but they simply suffer from a diminished computer self-efficacy. It is obvious that steps need to be taken to remedy this problem.

Another conclusion that can be drawn from the results is that even though their level of knowledge and competence went up through the years, because students had become aware of how much more there was to learn, no significant increase in their self-efficacy was observed.

The relationship between self-efficacy beliefs

Further statistical analysis has shown that students' perceived self-efficacy for information literacy and their computer self-efficacy are correlated ($r = 0.387$, $p = 0.000$, $n = 179$). In other words, a positive change in one causes a positive change in the other, or vice versa. Since computer literacy is accepted as a prerequisite for information literacy such a relationship is to be expected.

Conclusions and suggestions

Based on our findings, it is recommended that in addition to acquiring the necessary knowledge and skills methods have to be developed to increase the level of student's perceived level of self-efficacy regarding to these knowledge and skills. In addition, a better understanding of how self-efficacy beliefs affect individuals' information problem solving behaviors and lifelong learning activities is needed. Research should be conducted on the psychological factors that affect the development of students' perceived self-efficacy for information literacy. The results of such research will contribute not only to the curriculums of the information and library science departments but also to the all sorts of

	n	$\bar{X}$	SD
First year	40	2.50	0.34
Second year	29	2.70	0.42
Third year	62	2.66	0.52
Fourth year	48	2.67	0.45
General total	179	2.63	0.45

Table IV.
Subjects' computer self-efficacy

information literacy instruction. The measures should be taken for improving the quality of education; taking into account the results to be obtained from such research. Furthermore, frequent evaluation of students' perceived self-efficacy for curriculum related areas should be conducted.

Notes

1. In this paper, the definition of information literacy is based on *Information Literacy Competency Standards for Student Learning* (American Association of School Librarians and Association for Educational Communications and Technology, 1998) and *Information Literacy Competency Standards for Higher Education: Standards* (Association of College and Research Libraries, 2000). Information literacy is more than good information-seeking behavior. It incorporates the abilities to recognize when information is needed and then to initiate search strategies designed to locate the needed information. It includes evaluating, sythesizing, and then using information appropriately, ethically, and legally once it is accessed from any media, including electronic or print sources (Association of College and Research Libraries, 2001). It also includes communicating and sharing the results of the information problem-solving efforts accurately and creatively across the range of information formats, and evaluating how well the final product resolved the information problem and how appropriate and efficient the steps taken to reach the desired outcome. Furthermore, an information literate individual devises strategies for updating self-generated knowledge and recognizes the principles of intellectual freedom and equitable access to information.
2. Here are some examples: "I feel confident and competent to determine what information is needed", "I feel confident and competent to identify potential sources of information", "I feel confident and competent to locate information sources in the library", "I feel confident and competent to access specific information within the resources by using internal organizers (i.e. indexes, table of contents, cross references)", "I feel confident and competent to initiate search strategies by using keywords and Boolean logic", "I feel confident and competent to determine the authoritativeness, currentness, and reliability of the information", "I feel confident and competent to differentiate between fact, and opinion", "I feel confident and competent to summarize and paraphrase the information", "I feel confident and competent to choose a communication format (i.e. written, oral, visual) appropriate for the audience and purpose", "I feel confident and competent to provide appropriate documentation (bibliography)".
3. Some of the courses offered in the Department: Information Sources, Organization of Information, Research Methods, Reference Sources and Services, Databases, Database Management Systems, Information Retrieval, Abstracting and Indexing, Cataloging and Classification, Information Management in Social Sciences, Arts and Humanities, and Science and Technology.
4. Courses offered in the Department related to computers and technology: Introduction to Computers, Programming, Library Automation, Information Technology, Database Management Systems, Information Networks and Internet, Office Automation.

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