Developing information literacy skills of the 6th grade students using the Big6 model

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ABSTRACT
The Big6 model is a systematic approach to information problem-solving that relies upon critical thinking skills. It is the most used model for information literacy instruction in schools worldwide. Since there is a lack of information literacy skills instruction in the educational system of Iran, especially in primary schools, this research evaluates an information literacy intervention in the Iranian 6th grade science classroom. The study employs a mixed-method explanatory design using a true experimental method with pre-test and post-tests. The qualitative phase investigated the experiences and perceptions of the experimental group. Results show that integrating the Big6 model into the primary science curriculum helps the students to improve their information literacy skills as well as gain a deeper understanding of the research process. Overall, the research contributes evidence to show the effectiveness of a collaborative teaching approach in information literacy instruction. This approach promotes positive attitudes among students towards the school library and the school librarian's role in the educational process.

Keywords: Information literacy instruction; K-12; Information literacy curriculum; Primary science curriculum; The Big6 Model.

INTRODUCTION

In the information age, K-12 students must deal with the information overload and the availability of numerous information sources; making it is becoming increasingly important to promote information literacy (IL) skills among students. According to Argelagos and Pifarre (2012) creating awareness of IL is an important goal for schools. That is why with the release of information literacy standards by the American Library Association (ALA) in 2000, librarians have shaped the concept of IL instruction (Rader 2002). The link between IL and education had led educational systems to integrate IL skills within their curricula (Candy 2002; Sundin 2008); and this has made dramatic shifts in the educational systems of many countries such as the United States, United Kingdom, France and Australia (Ferreiro 2005). Eisenberg (2008) believes that education is fundamentally information-based and each aspect of learning needs information searching, collecting, synthesizing and exchange. Other researchers (Byerly and Brodie 1999; Bruce 2004, 2008; Bundy 2004; Lau 2006;

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Horton 2007; Limberg, Sundin and Talja 2012) also see the importance of IL for its potential to encourage deep learning as of one the critical skills for lifelong learning. Also, there is a large body of international research on IL skills instruction and the integration of these skills into the curricula (Bruce 1997, 2004; Bundy 2004; Tuominen, Savolainen and Talja 2005; Bruce, Edward and Lupton 2006; Savolainen 2009; Lyold 2012; Majid et al. 2016; Seufert et al. 2016; Squibb and Mikkelsen 2016; Yu, Abrizah and Sani 2016).

In recent years the Ministry of Education in Iran has recognized a need for educational system reformation. As part of its agenda, the ministry began developing national programs and policy documents in order to make fundamental changes in the educational system. The *National Document of Educational Development in the Twenty Years Perspective* (Ministry of Education 2005), the *Document of Fundamental Revolution in Education* (Ministry of Education 2011) - and the *Document of National Curriculum* (Ministry of Education 2012) are some of the evidences of this move. These documents emphasize on using the resource-based teaching methods and promotion of lifelong learning in the K-12 setting. Despite setting of an agenda by the Ministry of Education for educational system reformation, research (Haidari-hemmatabadi 2006; Babolhavayeji and Eini 2009; Lotfimaher and Dortaj 2011;) shows that IL skills and school libraries have not had an important place in the national education documents, primary curricula and textbooks. Moreover, in Iran, the system of education is very much text-based and teaching for most of the curricula emphasizes on lectures, memorizing of content, and drills. This means that most teachers do not feel a serious need to use the resource-based teaching methods which encourage students to use the school library and its resources or to be information literate. This has led to the weakening of, and even the removal of primary school libraries and IL skills instruction from the educational process. Meanwhile, information and its related technologies have become ever more important and so more than ever, students need to be information literate. In order to keep pace with information and communication technologies, the educational system must start teaching IL and lifelong learning skills from the elementary level in order to be more successful in reaching its goals. To sum up, there is a big need for IL skills instruction in the K-12 setting in Iran. These skills must not be ignored because they provide the basic elements of the lifelong learning process in the educational system revolution. To correct this, the current study attempts to develop IL skills lessons and integrate them into the Iranian Primary Science Curriculum using the Big6 Information Problem Solving Model. The objective of the study is to (a) identify to what extent integrating IL skills instruction into Iranian primary science curriculum will improve the IL skills of the 6^{th} grade students; and (b) evaluate the quality of the instruction by identifying actual experiences and perceptions of the students who participate in the intervention. Through a mixed-method approach and combination of both quantitative and qualitative methods, the aim is to build a framework for IL instruction in K-12 setting in Iran.

LITERATURE REVIEW

There is a large body of international research on IL skills instruction and the integration of these skills into the curricula (Bruce 1997, 2004; Wolf 2000; Gibson 2002; Bundy 2004; Tuominen, Savolainen and Talja 2005; Bruce, Edward and Lupton 2006; Savolainen 2009; Moreira 2010; Lyold 2012; Chen and Ma 2012). Most of these studies reports positive results of training in library and problem-solving skills and the integration of IL instruction into the curriculum. In addition, IL instruction has improved other skills such as critical thinking and problem solving, has changed students' attitudes towards librarians and their

role in shortening the time and has reduced the effort required by students to learn the information seeking process. Students are learning IL skills with process models, such as Kuhlthau's ISPA model (Kuhlthau 2004) and Eisenberg and Berkowitz's (1990) Big6 model, which connect students to the real-world use of information. Spiranec and Zorica (2010) mentioned Kuhlthau's model as an example of a constructivist's cooperation in describing IL and the concept of making knowledge. Savolainen (2009) believes that**,** unlike the previous views of IL as a set of skills, from the constructivist perspective, information users are active creators of the information environment. It seems that the entire framework of IL using such process models is embedded in constructivist learning theory. Furthermore, there is a large body of IL studies that claim IL instruction should be integrated across all content areas through inquiry-based or problem-solving learning (Eisenberg, Lowe and Spitzer 2004; Heider 2009; Chen 2011).

A few studies on IL instruction in the K-12 setting has been conducted using qualitative methods or quasi-experimental methods. Wolf (2000), Gibson (2002), and Bot (2008) studied the effectiveness of the Big6 model for students solving information-based problems through a qualitative method. They concluded that students need to learn to use a framework or process to perform inquiry, guided by teachers and librarians who collaboratively follow students' processes with support and scaffolding through mentoring and social negotiation. Julien and Barker (2009), Moreira (2010) and Squibb and Mikkelsen (2016) found that IL instruction could be better integrated into elementary school classrooms through a wider collaboration between teachers and school librarians.

A number of IL studies have focused on investigation of IL instruction by using experimental methods. Chen (2011) investigated the effects of integrating IL into the first-grade science curriculum on students' learning of science. In this quasi-experimental study, two first-grade classrooms from a public elementary school were randomly assigned into the experimental group and control group. The experimental group were exposed to an inquiry-based science curriculum which infused IL using the Super3 model, while the control group experienced traditional lecture-oriented instruction. Analysis of covariance showed that the experimental group significantly outperformed their counterparts on two measures of science learning. This study suggests that integrated IL instruction has a positive impact on first-graders' subject content learning and lays a foundation for young children to be lifelong learners. Several studies (Chu, Chow and Tse 2011; Argelagós and Pifarré 2012; Chen and Ma 2012; Detlor et al. 2012) reveal a positive impact of collaborative inquiry teaching on the improvement of students' IL and information technology (IT) skills.

Studies by Yu, Abrizah and Sani (2016), Majid, Chang and Foo (2016) and Seufert et al. (2016) focused on the teacher's conceptualization of IL and their understanding of IL practices. Majid, Chang and Foo (2016) highlighted the need for developing a roadmap for providing IL skills at different grade levels and in different subject areas. Seufert et al. (2016) concluded that developing a learning-conducive school culture can be regarded today as one of the key challenges for the successful implementation of educational innovation and continuous quality improvement processes.

IL research in Iran began in the late 1990s and one of the earliest study in IL argued for the necessity of IL instruction in schools (Khosravi 1996). Until 2004 the number of IL studies was less than 5 articles per a year with most of the IL research in Iran being done between 2000 and 2010. A review of IL research in Iran shows that among 226 IL articles there is a big focus (57 articles) on investigating IL skills level of university students. Few of these (21

studies) involve IL instruction. A typical example is the work of Nazari (2006) who developed an IL lesson plan for university students and tested it on them using a quasi-experimental method. Results of this study showed that using the lesson plan to instruct university students increased their IL skills level. Only a small number of studies have focused on IL instruction in the K-12 setting (Naderi and Zahedi 2009; Hakimi and Tabassi 2010; Poursalehi, Zandian and Fahimnia 2011). Eini (2009) proposed a framework for IL instruction to be embedded in the National Document of Educational Development in the Twenty Years Perspective (Ministry of Education 2005). Eini (2009) used a survey and content analysis method and the results showed that the IL skills received little emphasis in this document. Yari (2011) also concluded that most of IL research has been done in the academic environment and has had no impact on Iranian education policy and national documents.

A review of the literature shows that after four decades of raising IL research in the world there are many models offered in this area (Eisenberg and Berkowitz, 1990; Bruce 1997; Pappers and Tepe, 2002; Kuhlthau 2004; Bruce, Edwards and Lupton 2006; Mokhtar et al. 2009; Savolainen 2009; Limberg, Sundin and Talja 2012). The world has moved on from classroom paper-based learning to resource-based and therefore IL, lifelong learning and related concepts have an important place in the school curriculum. In many studies IL instruction of students has been done through integration of these skills into the curriculum and classroom (Chen 2011; Chu, Chow and Tse 2011; Argelagós and Pifarré 2012; Chen and Ma 2012). Most researchers used the problem-based and inquiry approach for teaching IL skills to school students. In these studies, there was a focus on the impact and the importance of the collaboration in schools because the primary and secondary teachers needed professional development support (Julien and Barker 2009) as they had had no prior training on how to teach IL skills.

OBJECTIVES AND METHOD

The main objective of this study is to (a) identify to what extent integrating IL skills instruction into Iranian primary science curriculum will improve the IL skills of the 6th grade students; and (b) evaluate the quality of the instruction by identifying actual experiences and perceptions of the students who participate in the intervention. The research question posed is: “What are the actual experiences and perceptions of the students who participate in the research intervention?”

Because the Big6 model is the most widely used model of IL education in schools worldwide (Eisenberg 2008), it was chosen in this research as the tool to integrate IL in the Iranian primary science curriculum. The Big6 model is a systematic approach which has 6 components: Task Definition; Information Seeking Strategies; Location and Access; Use of Information; Synthesis; and Evaluation. Each main component is then subdivided into two sub-skills, the “Little12”, which are questions the learner needs to answer to become better engaged in the process of gathering appropriate, necessary and relevant information (Eisenberg and Berkowitz 1999).

The research has the following two hypotheses:
Hypothesis 1**:** IL skills level of the Iranian 6th grade students who have received instructions based on the Big6 model for the science curricula, improve more than the students who have been trained with the traditional method.

Hypothesis 2: The effectiveness of using the Big6 model integrated into the Iranian 6th Grade science curriculum in improving the students IL skills level will continue in the two-month follow-up.

This research was conducted using a mixed-method explanatory design, employing both quantitative and qualitative methods. In this design the qualitative data helped explain or built upon initial quantitative results (Creswell et al. 2003). The design was sequential, with quantitative and qualitative studies being done in distinct phases using, collecting, and analyzing one type of data before obtaining and processing the second type of data. The quantitative approach was used to examine the research hypotheses based on an intervention (true experimental method). The research question was addressed using the qualitative method through interviews with the selected participants. Figure 1 shows the research design of the current study.

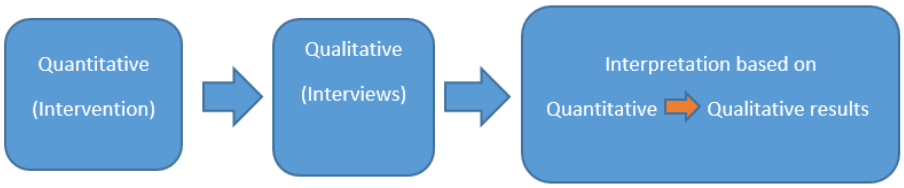

Figure 1: The Research Design

Quantitative Method

a) Design and Procedure

A true experimental method with pre-test and post-test used for examining the research hypotheses. Table 1 shows the research design of the experimental phase of the study.

Table 1: Experimental Phase Research Design

Group	Sampling	Pre-test	Treatment	Post-test
Experimental (E)	Random (R)	O1	X (instruction)	O2
Control (C)	Random (R)	O1	-	O2

The experimental process had four phases:

i. A pre-test was conducted on the control and experimental student groups at the beginning of the research.
ii. After the pre-test, students in the experimental group were taught the science curriculum integrated with the Big6 model skills. The control group only received traditional teaching.
iii. Next, the post-test was conducted on all students in both groups after 10 sessions of IL skills instruction.
iv. After two months, a follow-up test was conducted on all students of the two groups to identify student's IL skills learning sustainability.

b) Participants

Participants of the study consisted of two groups of year six students selected randomly after running pre-test among all students of a public primary girls' school in an urban area of Ahwaz, Iran. From the 4 areas of educational administration in Ahwaz city, area number 4 was randomly selected using a simple random sampling method. Then from the public

primary schools of this area which had a school library and librarian, one primary school was also selected using the simple random sampling method by assigning numbers to primary schools of area number 4 and finding a random number among them. After running the pre-test in this school, two groups of year six students were selected. Each group had 24 students.

c) Research Tool

The research tool was a modified version of the Tool for Real-time Assessment of Information Literacy Skills (TRAILS) for the 6th grade students. TRAILS is a widely used tool to assess IL skills of students in different grades in the United States (Eisenberg 2008). As one of the projects of the Institute for Library and IL Education (ILILE), TRAILS (available at www.trails-9.org) was developed by Kent State University faculty with the assistance of school librarians. The test includes 20 multiple-choice questions to assess the IL level of students of the third, sixth, ninth and twelfth grades in 5 categories: (i) Developing topic; (ii) Identifying potential sources; (iii) Developing, using, and revising search strategies; (iv) Evaluating sources and information; and (v) Recognizing how to use information responsibly, ethically, and legally. Baji and Bigdeli (2016) adapted this tool for the Iranian 6th grade students in science curriculum in two parallel versions. Parallel versions of the test provided in order to avoid problems inherent with post-test of the research. Parallel versions of the test are different in the form of the questions and not the content so, they cover the same content that must be tested. Version A was used for the pre-test and version B was used for the post-test.

d) Instructional materials and procedure

The instructional materials used in the intervention included 12 sessions of teaching the 11th and 12th units of the Iranian sixth-grade science curriculum integrated with the Big6 model. The titles of these units are: “To whom is the jungle?” and “Wonders of the leaf”. The instructional content is based on the lesson plans developed by Baji et al. (2016) for the 11th and 12th units of the Iranian sixth-grade science curriculum (Table 2).

During the second semester, students of the experimental group were introduced to the study and informed of their participation regarding the research ethics and their parent’s permission. The first researcher attended the class and delivered the introduction. Students were provided instruction for 12 sessions with collaboration of the teacher and the school librarian. The students completed a research process based on the Big6 model in two 45 minutes’ sessions over the six weeks with the same teacher and school librarian. Students in the control group received traditional instruction for the two science units. After the instructional sessions were completed, students of both groups received the post-test. The number of correct answers was scored and the gain scores between the pre and post-tests provided a measure of the overall IL skills improved level.

e) Pre and Post and Follow-Up Tests

All 228 sixth grade students of a randomly selected primary school for girls in an urban area of Ahwaz, Iran received the pre-test (version A of modified TRAILS) to determine their IL skills level. The low cut-off point for the Iranian sixth grade female students in the modified version of TRAILS is 7.92 out of 20 (Baji and Bigdeli 2016). Next, 48 students who obtained ≤ 8 in the pre-test were selected and assigned randomly in two groups With 24 students in the experimental group and 24 students in the control group. After the treatment, a post-test (version B of modified TRAILS) was applied to the students of the two groups in the context of the classroom in order to ensure ecological validity. A follow-up test was then

conducted two months after the post-test to assess the continuity of IL skills learning of the students of the two groups.

Table 2: The Big 6 Instructional Sessions for Unit 11 and 12 of the Iranian Sixth-Grade Science Curriculum

Session	Instructor	Content
1: Introduction meeting	Researcher	The researcher attends the class and delivers the introduction. Students receive explanations about the research project goals, stages of the work, curriculum and the research framework
2: Teaching the 11th unit	Teacher	Teaching the 11th unit including photosynthesis in plants
3: Teaching the 12th unit	Teacher	Teaching the 12th unit including the food chains and networks
4: Introducing the Big6	Teacher/School librarian	Introducing the Big6 model and its six stages and sub-stages
5: Teaching the first skill	Teacher/School librarian	Introducing the Task definition and the ways of limiting the research topics. Students will take a topic from the 11th and 12th unit to research. Define the information problem and identify the information needed
6: Teaching the second skill	Teacher/School librarian	Introducing the information seeking strategy including determining all possible sources and selecting the best sources
7: Teaching the third skill	School Librarian	Help students to locate and access the resources intellectually and physically and finding information within them
8 and 9: Teaching the fourth skill	Teacher/School librarian	Teaching students how to use the information including engagement and extracting relevant information and evaluating it.
10 and 11: Teaching the fifth skill	Teacher	Teaching students how to synthesis the extracted information including organizing the information from multiple sources and presenting it
12: Teaching the sixth skill	Teacher/Researcher	Asking students to fill the reflection self-assessment of the whole research process

f) Internal Validity

The internal validity of the intervention was observed by controlling main confounding variables:

i) Testing: controlled by having a parallel version of the pre and post-tests. Parallel versions of the test are different in the form of the questions and not the content so, they cover the same content that must be tested.
ii) Differential effect: controlled by dividing the students randomly in the experimental and control groups through assigning numbers to students and finding random numbers to assign them in one of the groups
iii) Diffusion: controlled by running the intervention out of the school time (Gall, Borg and Gall 2009).

g) Data Analysis

The data was analyzed using an analysis of covariance (ANCOVA) on post-test scores, with the pre-test as the covariance, to determine any significant differences between the

experimental group and the control group. The equality of the variances was analyzed using the Levene's test.

Qualitative Method

In the qualitative phase of this study, experiences and perceptions of the experimental group were studied in order to interpret the intervention results. The experiences and perceptions of the students were obtained by conducting semi-structured interviews with students who participated in the research intervention.

a) Sampling and Research Tool

Ten (coded as I-1 to I-10) students were selected from the experimental group using a purposive sampling method. In order to cover opinions of all students, a number of students who got a high score, moderate score, and lower score at the post-test were selected to be interviewed. The research tool in this phase was the semi-structured interview. An interview guide was prepared with a list of questions and main topics, including open-ended questions about: (i) student's feeling of participating in the IL instruction; (ii) their experiences; (iii) their opinion about the school library and librarian before and after the intervention; and (iv) their perceptions of the Big6 skills. Interviews were conducted in the school library and students were informed that the audio of their interviews would be recorded.

b) Data Analysis

After converting the recorded interviews to text, key concepts and main themes were extracted using the open coding technique. The four main concepts extracted from the interviews were: "introduction to research process", "understanding the library resources", "legal use of information", and "reflection self-assessment". The second stage of coding consisted of reading all interviews again to tabulate the number of cases each type of item on the four concepts list appeared. Concepts with shared meaning or characteristics were then grouped forming categories. The extracted concepts and categories were used for interpreting the intervention findings.

FINDINGS

Experimental Phase Findings

Before running the analysis of covariance (ANCOVA), it was necessary to determine the relationship between the dependent variable and the covariate. For this purpose, the homogeneity of variances was tested using the Levene's test (Table 3). The equality of scores distribution was tested by using the Kolmogorov–Smirnov test (K–S test or KS test). Levene's test showed that the difference between two groups was not significant ($F = 0.64$, $P < .05$) and the Kolmogorov–Smirnov test results indicated that the scores distribution of the two groups is equal.

Table 3: Levene's Test and Kolmogorov–Smirnov Test Results

Tests		**Levene's test**			**Kolmogorov–Smirnov test**	
Variable	*F*	Df1	Df2	Sig	*Z*	Sig
IL skills	0.64	1	64	0.42	1.28	P = 0.07

The ANCOVA test was used for examining the first hypothesis of the research. The obtained F ratio was significant (F = 164.32, P < .001) meaning the first hypothesis of the research was confirmed (Table 4). Thus, the IL skills level of the Iranian 6th grade students who received instruction based on the Big6 model improved more than those students who only received the traditional instructions.

Table 4: Summary of ANCOVA Test Statistics in Post-Test of Two Groups

Tests Variable	*SS*	Df	*MS*	*F*	sig
IL skills	642.07	1	642.07	164.32	P < 0.001

The obtained F ratio for examining the second hypothesis of the research was found to be statistically significant (F = 386.88 P < .001). Hence, the students who received instruction based on the Big6 model retained their IL skills level after two months (Table 5).

Table 5: Summary of ANCOVA Test Statistics in Follow-Up Test of Two Groups

Tests Variable	*SS*	Df	*MS*	*F*	sig
IL skills	386.88	1	386.88	35.79	P < 0.001

Qualitative Phase Findings

The qualitative phase investigated the actual experiences and perceptions of the students who participated in the research intervention in order to interpret the intervention results. Table 6 presents the key concepts and categories extracted from the semi-structured interviews with experimental students. Interviews revealed that students had a change in their attitude toward the research process. They said that before receiving IL instruction they did not know how to do research step by step. They described their feelings toward the research process with sentences such as: "I feel I'm a responsible person now", "I feel I have a sense of awareness now", "and I feel I'm knowledgeable". One stated "In the Big6 skills training course we did more practical work and learned many tips about ways of finding and organizing the needed information" (I-10).

Table 6: Key Concepts and Categories Extracted from the Interviews

Key concept	Category	Student's interview code
Introduction to research process	Interest in research	I-1 to I-10
	Become familiar with research process	I-6. I-10, I-8
Understanding the library resources	Positive perspective of the library	I-1 to I-10
	Internet search skills	I-7, I-4, I-3, I-2, I-1, I-9, I-10
Legal use of information	Become familiar with plagiarism	I-1 to I-10
	Learning note-taking	I-5, I-6, I-9, I-3, I-1
Reflection self-assessment	Lack of time for doing the research	I-1 to I-10
	Need for more instruction	I-1 to I-10
	Not accessing information resources	I-8, I-6, I-5

In Iran, the education system is very much text-based and students and teachers do not feel a serious need to use the school library and its resources. The interviews revealed more details about this issue. Many students noted that because the school library is very small, they hardly got access to it and did not know the variety of the library resources available

before taking part in the IL skills training course. During the intervention course they visited a big public library. One students acknowledged: “I liked the public library, it has many sections. Before this, I did not know a lot about the library. I thought that a library just has a catalogue and only books are kept in the library. But, now I know that a real library has many types of information resources and various information services are offered in libraries” (I-2). Another student noted that: “If our school library gets equipped with all sorts of resources we can use them to do better class assignments” (I-3).

In this study students also learned how to select keywords, how to browse web pages, how to use online encyclopedias, and how to choose a related search result during an Internet searching session. I-5 remarked: “Well, it is easier to search the Internet than going to the library and trying to find a book because it takes less time. But, we should be aware of the proper way of using the Internet, because many web pages in the Internet are not reliable.” Many students mentioned that having a good library with Internet stations is necessary for doing the assignments and learning new things.

Surprisingly, “Legal use of information” is the category that all students referred to it as a very new skill. Most of them did not know the meaning of “plagiarism”. They mentioned “cutting and pasting” text in their assignments before knowing the real meaning of plagiarism. I-1 stated: “Well, searching in the Internet is a lot easy [sic] and I was thinking that cutting and pasting texts from the Internet is the right thing. But, now I know that this is plagiarism. In this training course I learned how to take research notes, how to paraphrase and write them with my words and how to cite the writer of the original text.”

Self-assessment is the last stage of the Big6 model. In this stage the first researcher asked the students to fill in the self-assessment form in their The Big6 Model Workbook and assess their whole process of research. However, reflection of self-assessment revealed that students did not have highly developed search skills. Generally, students scan the first three or four web sites that appear in the search results for matching keywords.

Almost all of the student participants mentioned that they need more training courses to learn about the process of collecting and extracting the proper information from the information sources. According to the interviews, students noted the fourth and fifth stages of the Big6, i.e. Use of information and Synthesis, as the most difficult. The interviews also revealed students’ unsophisticated critical evaluation skills and lack of understanding of criteria such as authority, accuracy, objectivity and currency. I-6 noted: “My Big6 assignment does not cover what teacher wants because I could not find the proper information and synthesize it well. I think I need more instruction about this.”

DISCUSSIONS

The results of this study show that the experimental group performed significantly better in the IL skills test than the control group. These results support previous research, such as by Julien and Barker (2009), Moreire (2010), Newell (2010), Chen, (2011), Chu, Chow and Tse (2011), Argelagos and Piffare (2012), Chen and Ma (2012), Detlor, et al. (2012), and Chen, Yang and Huang (2014). Chen (2011) believes that integrating IL skills instruction in the school curriculum has a positive impact on students' learning and improves their ability, this opens the path to life-long learning skills for the students. Similarly, the current study has shown that using the Big6 model integrated into the Iranian 6th grade science

curriculum helps the students to improve their IL skills as well as gain a deeper understanding of the research process.

Working with the Big6 research process was a first for the experimental group. Not surprisingly, the researchers found that some things worked and others did not. Students' perceived level of familiarity with defining a research problem, using the proper search strategies, note-taking, extracting needed information from the resources, citing the resources and legally using the information improved significantly for almost all dimensions of these Big6 skills. However, some skills such as evaluating the Internet, web pages and synthesis, did not work very well due to lack of time. It is essential to make the Big6 process clear to the students, and the teacher and the librarian need more time to explain the steps and give the students more opportunity to ask questions and do some brainstorming.

Overall, the research findings contribute evidence for the effectiveness of a collaborative teaching approach in IL instruction. Results showed that the Big 6 skills changed student's attitude towards the research process and library services; this has led to a more precise consideration in performing a research or resource-based task. In this regard, most students stated that before the intervention they were not familiar with library services. It can be said that such outcomes gained because of improvement in the IL skills level of the experimental group. Results of the current study emphasizes the importance of the existence of specialized librarian and a library equipped as the main elements of IL instruction in schools. In addition, the importance of teacher and librarian cooperation in guiding the IL skills instruction should not be ignored. Collaborative teaching promoted positive attitudes among the students toward the school library and the school librarian's role in the educational process. Findings of the current study are consistent with that of others in Iran (Fatahi, Saberi and Dokhtesmati 2009; Hakimi and Tabassi 2010; Poursalehi, Zandian and Fahimnia 2011). If one assumes IL skills instruction in schools as a triangle, the curriculum, teacher and librarian from the three side of it and any planning for IL skills instruction in schools that misses one of these sides would likely fail.

CONCLUSION

This study demonstrates that a primary school teacher and the school librarian can move beyond established traditional roles and responsibilities and collaborate in teaching IL skills to students. It is important that educational planning for IL instruction in the school setting involve cooperation between class teachers, and librarian(s) and is integrated into the curriculum. The research results reveal the necessity of including specialised, 'hands on' IL skills instruction involving class teachers, librarians, and libraries in the national documents of education in Iran.

In conclusion, this study provides evidence of the way in which IL instruction can be applied through the design of a structured and supported program integrated with the school curriculum in order to improve students' IL skills level and their understanding of research concepts. This type of IL skills instruction should help provide primary school students with lifelong learning competencies that may help them in better use of information in their daily life. Future studies can systematically investigate the efficacy of integrating IL instruction in classroom teaching through curriculum design. Such a body of research will give education policy makers even more incentives to mandate the inclusion of IL skills in curricula.

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