

From Dependence to Independence: Personalised Coaching as a Tool to Entrench Information Literacy Competencies in Students

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Although it is widely believed that information literacy (IL) competencies are useful in helping students perform better in their schoolwork and beyond, limited empirical evidence is available showing the relationship between IL competencies and IL education. While a lot of research has been done worldwide and most of the findings have proven that IL is a much-needed skill by students, little research has been conducted on IL teaching approaches or what is termed IL pedagogy. To date, studies on IL have mainly focused only on students' information skills per se, on library skills or on ICT education. None of these studies has assessed the different approaches to IL education. This paper provides an overview of a research study that investigates the impact of an IL teaching approach in the form of personalised coaching, which is grounded in the pedagogy known as mediated learning, on students' level and applicability of IL competencies. Through the application of a quasi-experimental pretest-posttest control-group design, as well as student responses in the post-experiment semi-structured group interviews, it was found that personalised coaching (or mediated learning) helps students perform better in the learning and application of IL competencies.

Information literacy (IL) has become a crucial skill in the current knowledge society. For students, the key to becoming independent learners and future knowledge workers lies in being information literate. However, existing IL education approaches have not always been very successful in ensuring that students learn and apply IL competencies effectively, and are able to show mastery of the learning and research process. Thus, IL education that is built on pedagogical theories and approaches, such as instructional scaffolding and mediated learning (or coaching in general), is necessary as it would facilitate students' erudition and understanding of IL competencies, which in turn leads to better application of those competencies in their schoolwork.

Related Literature Review

1. *Information Literacy*

Many definitions of information literacy (IL) have emerged since its initial usage in a 1974 government report that was collated by Paul Zurkowski (Kapitzke, 2003). Many authors and IL researchers have described IL as requisites to lifelong learning (Candy, 2002; Gee, Hull & Lankshear, 1996; Moore, 2002). Others have described it as a natural extension of the concept of literacy in our society (Bruce, 2002; Stern, 2002). Some have acquainted IL with information technology (Mitchell, 1996; Mobley, 1996), while others have used it interchangeably with library skills (Kuhlthau, 1990). However, one of the most widely accepted and cited definition (Behrens, 1994) is that given by the American Library Association (ALA) in its landmark report in 1989. It essentially states that an information literate individual is one who recognizes the need for information, is able to effectively access, evaluate, and creatively use information, and is also an independent learner who demonstrates proactive social responsibility (ALA, 1989).

2. *Information Literacy and Pedagogy*

Teaching IL to students does not merely involve library or bibliographic instruction or the ability to use different information sources effectively. It also includes teaching critical and analytical thinking skills regarding the use of information (Kasowitz-Scheer & Pasqualoni, 2002), as well as the ability to generate new ideas from current information and prior knowledge. Numerous and diverse initiatives and strategies to teach IL have been implemented in schools in the US, Australia, New Zealand, South Africa, the UK and throughout Europe (Moore, 2002; Rader, 2002; Virkus, 2003).

Numerous schools around the world have been outfitted with current ICT infrastructures that would enable their students to develop learning opportunities by exploiting these modern tools (Bruce, 2002). However, furnishing schools with modern and advanced technological amenities does not necessarily equate to the students and teachers being competent enough to effectively utilise those tools as information literate individuals. Both students and teachers would only be able to fully benefit from their learning when IL instruction that is grounded in sound and effective pedagogy is seamlessly intertwined with the use of ICTs.

3. *Pedagogy and Learning Theories*

In pedagogy, educational theorists have developed learning theories that can be broadly categorized into four orientations: behaviourist, cognitive, humanistic, and social/situational (after Merriam & Caffarella, 1991 as cited in Smith, 1999). In general, the majority of these learning theories have often viewed learning as a process rather than a product.

Briefly, the behaviourist orientation views learning as a process where stimuli in the external environment cause a change in the behaviour of the learner in a desired direction. The cognitive orientation focuses on the learner's internal mental processes of knowing, whilst the humanistic orientation is concerned with the affective part or feelings of the learner. The latter orientation also looks at the development of the learner as a whole - the complete intrapersonal growth and not just the cognition - whereas the social/situational orientation involves the development of the learner in the context of a society or the learner's interpersonal interactions and eventually personal growth.

Knowledge of the various learning theories is important in understanding how the teaching of IL skills can be carried out. However, it is equally important and beneficial to be aware of the various learning styles of students, in order to know the different preferences that students have when it comes to learning.

4. *Feuerstein's Theory of Mediated Learning Experience*

Reuven Feuerstein, who is a renowned cognitivist theorist, developed his Theory of Mediated Learning Experience (MLE), which suggests that intelligence is dynamic and can be modified. To be specific, Feuerstein's theory does not exclusively belong to the cognitive orientation. His model of stimulus-human intervention-organism-human intervention-response (S-H-O-H-R) is an extension of Piaget's model of stimulus-organism-response (S-O-R) (cognitivist), which simultaneously incorporates Skinner's operant conditioning (behaviourist), and Vygotsky's instructional scaffolding that is grounded in his theory of Zone of Proximal Development (social/situational).

Feuerstein postulates that intelligence is dynamic and variable; that it is not static or fixed from birth; and that intelligence can be modified if given the right stimulation and environment, through a mediator (Feuerstein, 1980). Although Feuerstein's theory of MLE is not easy to carry out as it involves a deeper level of commitment and effort on the part of the teacher-mediator, it promotes cognitive development in the learner that is evident and lasting (Ben-Hur, 1998). Studies have also shown that students who undergo the MLE programme show significant improvement in mathematics and reading (Greenberg, 1992).

It is thus pedagogically sound to apply Feuerstein's MLE in helping to entrench students' learning, as the MLE straddles three orientations of learning theories. This implies that a multi-faceted approach can be carried out simultaneously in helping students learn.

Statement of Problem

Although it is generally believed that IL competencies are useful in helping students perform better academically or otherwise, limited empirical evidence is available showing the relationship between IL competencies and IL education. Students have been found to have difficulty in applying learned IL skills in their academic work or real life situations (Elmborg, 2003; Harley, 2001). Albeit that a lot of research has been done worldwide and most of the findings have proven that IL is a much-needed skill by students, little research has been conducted on IL teaching approaches (Gibson, 2002; Moore, 2001) or what is termed IL pedagogy. To date, studies on IL have mainly focused only on students' information skills

per se, on library skills or on ICT education. None of these studies has assessed the effectiveness of different approaches to IL education. Thus, this study will pioneer research on the impact of IL teaching approaches which are grounded in pedagogy, specifically in the form of mediated learning, or personalised coaching, on students' level and applicability of IL competencies.

Methodology and Data collection instruments

A quasi-experimental pretest-posttest control group study was conducted with two clusters of 13 to 15-year-old students (grades 7 to 9) in Singapore. Before any intervention was carried out, the students in both clusters were asked to take the pre-intervention test. Thereafter, each cluster was given IL training that lasted 5 weeks. Each cluster of students was then divided into smaller groups of five students each. Each group was given an information-based task, and was supposed to look up information for the task. Ultimately, they were supposed to present what they have found out for their task to the class.

One cluster (experimental) was selected to undergo the mediated learning intervention. Students in this cluster were then closely coached and guided on how to apply the IL competencies that they learnt into doing their project.

Students in the other cluster (control) worked independently with minimal supervision rendered. After 6 weeks, both clusters of students (experimental and control) were asked to present their findings to the class as a group.

At the end of the 11 weeks, students in both clusters were asked to take the post-intervention test. The purpose of this test was to determine the impact of the different IL teaching approaches on their understanding and applicability of IL competencies.

To ensure consistency, the first author provided the information literacy instruction as well as the intervention component (i.e. mediated learning or coaching). Students were also not informed which cluster they belonged to, to minimise the threat of selection-history bias, where students who discover that they belong to the control cluster may decide that they are at a disadvantage and end up performing more poorly in the post-test. This was addressed by ensuring that students were not informed of the exact nature of intervention that was carried out with the experimental clusters. As far as possible, students were unaware that there was a difference in treatment between the control and experimental clusters, or that they belonged to either cluster. In addition, the duration of the study was kept optimal so that the effects of selection-history were also minimised.

The following diagram gives an illustration of the study design (Figure 1).

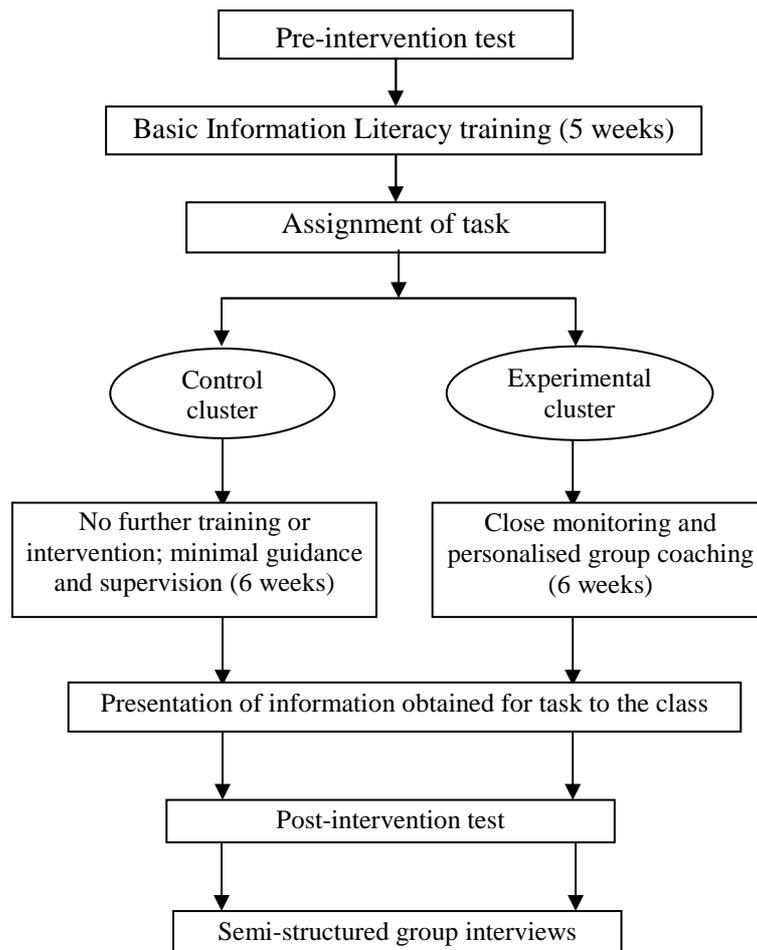


Figure 1: Study design

1. Pre- and post-intervention tests

Both the pre- and post-intervention tests were comparable in terms of scope and difficulty. Each test comprised mainly two components – (i) search techniques and strategies; and (ii) information use and misuse. Several questions were set for each component, giving a total of 32 elements in all.

2. Post-experiment semi-structured group interviews

Through simple random selection, one group of students from each class was selected to attend the group interviews. Students were asked five questions that sought to elicit their opinions on (i) the recently completed project; (ii) learning points from the project; (iii) transfer of skills learnt in the project; (iv) assistance provided by the instructor; and (v) recommendations for improvement to the implementation and execution of the project. Their responses to the five questions were transcribed and collated (note: Cluster 0 – control; Cluster 1 – experimental).

Data Collection and Analysis

1. Demographics

Altogether 279 students participated in the study. Table 1 gives the breakdown of the students who belonged to the control and experimental clusters respectively.

Table 1: *Breakdown of students by cluster*

	No. of students	Percentage
No coaching (control)	119	42.7
With coaching (experimental)	160	57.3
Total possible	279	100

For the pre- and post-intervention tests, there was a substantial response rate of 214 (76.7%) and 246 (88.2%) respectively (Table 2). Only students who completed both the pre- and post-intervention tests were included in the data analysis.

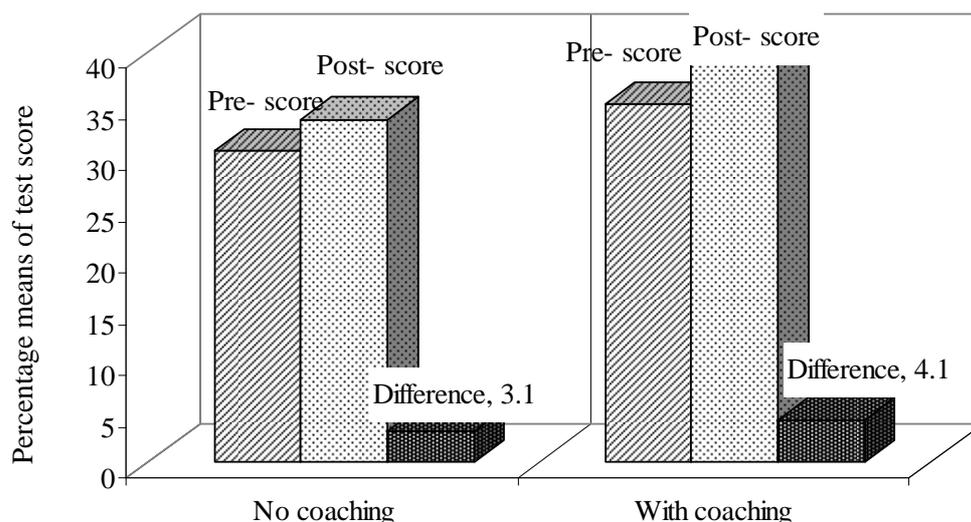
Table 2: *Response rates for pre- and post-test*

	No. of students	Percentage
Pre- test	214	76.7
Post- test	246	88.2
Valid cases for pre- and post- tests	201	72.0

2. Findings

A comparison of the means of the pre- and post-intervention test scores was made between the two clusters of students (Figure 2). For the pre-test, it was observed that students in the experimental (mediated learning intervention) cluster performed better (mean = 34.9). For the post- test, students in the experimental cluster still did better (mean = 39.0).

However, it was observed that the difference in scores (post – pre) was higher for the experimental cluster (difference = 4.1) compared to the control cluster (difference = 3.1) A paired samples t-test was carried out on the data, yielding an overall significance level of 0.004 for the experimental cluster, and a value of 0.054 for the control cluster. This implies that the difference between the pre- and post- intervention test scores was not due to chance variation and was in fact due to the intervention – more so for the experimental cluster.



Pre- score (%)	30.3	34.9
Standard deviation	11.81	13.23
Post- score (%)	33.4	39.0
Standard deviation	12.96	11.88
<i>p-value (paired)</i>	<i>0.054</i>	<i>0.004</i>

Figure 2: Percentage means of pre-, post-, and pre-post difference scores vs. cluster

From the semi-structured group interviews, the most common lament students had was that they did not have enough time to complete the project, as the project was done in addition to their normal curriculum, instead of being part of it (*“Not enough time to complete the project”* – Cluster 0; *“We had too many things to do and too little time”* – Cluster 1). Students from the control cluster claimed that they had difficulty acquiring and compiling information for their project (*“It was difficult to find information from the Internet, compile the information and write the report”* – Cluster 0), although this sentiment was not echoed at all by students in the experimental cluster.

It was also found that students (from both clusters) seem to have remembered what they learnt in doing the project. For instance, they said that they learnt how to search for information on the Internet, use Boolean operators, use and create bibliographies, and be more critical when reading information and evaluate information from various sources (*“We learnt about using search engines”* – Cluster 0; *“We learnt how to compare our search results to find the best information”* – Cluster 1; *“We also learnt about research skills, how to use the Internet more effectively, and how to develop search strategies”* – Cluster 0; *“We learnt issues such as copyright and how to develop bibliographies”* – Cluster 1).

With regard to the transferability of skills learnt in doing the project work, students felt that they could use the skills in other subjects (*“We can use the search skills we learnt in other subjects, such as in History when we do our research”* – Cluster 0; *“We can transfer the search skills that we learnt, as well as leadership skills that we picked up”* – Cluster 1).

When asked about the assistance that was provided by the instructor (i.e. researcher), students in the control cluster said that it was not enough and that they needed more coaching to help them understand better and provide them with more guidance (*“There should be more time for coaching us”* – Cluster 0; *“We need more assistance”* – Cluster 0; *“We should have more guidance to help us do our project”* – Cluster 0). They suggested that there should be more coaching on the part of the instructor, and less teaching. For this cluster, the researcher merely monitored their group work and discussions, without intervening, asking guiding questions or providing guidance. For the experimental cluster, they claimed that the coaching

was useful and helped to guide their project development. However, this cluster also mentioned that there should be more coaching, and less teaching (“*There should be more coaching and less teaching*” – Cluster 1; “*We were lost at first, but the coaching helped to guide us in doing our project. There should be less teaching and more coaching*” – Cluster 1; “*There should be more time spent on coaching, and less time on teaching. The guidance helps in our understanding and helps us to overcome difficulties*” – Cluster 1).

In general, both the experimental and control clusters recommended that there should be more hands-on activities when learning IL skills. They also suggested that the IL training and project be incorporated within the curriculum, and be made examinable so that they would be given due recognition and credit for their work, and so that they would not have to do additional work in their already intensive curriculum.

To allow triangulation of the data collected, students in each cluster were also asked to do a small group project, where the final product was expected to be in the form of a group written report, artefact, and presentation. The final product was assessed by three neutral and independent teacher-examiners in a double-blind review process. Students’ written reports were also analysed for specific elements that demonstrate understanding and competence in information literacy, specifically (i) the use of various information sources; (ii) the inclusion of reliable and authoritative information; (iii) the use of citations; and (iv) the inclusion of a bibliography. Details of this set of data collection are found in Mokhtar, Majid & Foo (n.d.).

Discussion

As seen in Figure 2 above, the differences in pre-post test scores are quite apparent between the experimental and control clusters. This is a significant finding which indicates that IL competencies cannot be sufficiently learnt and applied when imparted through a one-time training, be it in the form of lecture-tutorial, workshops or hands-on sessions. The competencies need to be entrenched through close coaching and mediated learning so that students are able to identify their learning gaps, rectify them and improve their learning under the close supervision and guidance of an expert.

Farmer (2006) mentioned that naturally, children ask a lot of questions because they try to understand what goes on around them. He reasoned that asking questions is a crucial component of information seeking, and that it helps them to learn and change based on what they discover. However, he also claimed that youths may not necessarily know the right questions to ask in order to learn, and that this needs to be taught to them. In addition, the information explosion has created the need for more – and not less – guidance in the evaluation, selection, and use of information (Foo, Chaudhry, Majid, & Logan, 2002). Thus, even with the widespread availability of the Internet, students still need guidance and coaching on how to use the information found online effectively. These are both supported by the findings of the study, where it was found that close coaching or mediated learning makes a difference to how students performed in their IL test as well as in developing their group projects.

Hence, the role of a coach or mediator – one who is able lead students by asking the right questions for them to reflect on their learning, and who can then guide the learning process – makes a lot of difference. As Feuerstein (1980) explained, in close coaching or

mediated learning, students learn through the intercession of a mediator whose main role is to help them interact more fruitfully with the learning factor, and interpret or even modify their responses in order to increase their understanding. As such, in this case, students were able to entrench the IL competencies that they learnt from the IL training sessions, and were better able to apply these competencies in the posttest, through the questions posed by the mediator or coach.

Implications

From the findings of this study, it can be established that the application of learning theories makes a positive difference to students' learning of IL skills. It was found that the application of learning theories adequately facilitates students' learning, and enabling them to apply the skills more effectively, as exhibited in the posttest. It is thus important to recognise and understand the different approaches to teaching and learning, so that the appropriate assistance can be rendered to students to facilitate their learning; in this case it was through mediated learning or close, personalised coaching.

In the area of information studies and library science, this bears significant implications for instructional librarians and other IL educators in particular. Other than being equipped with domain knowledge in the discipline of information studies and library science, instructional librarians must also be equipped with pedagogical competencies (Rockman, 2004), such as learning theories, so that they are more aware of the different ways in which they can impart their knowledge to students or patrons in the library in order to successfully engage them (Jacobson & Xu, 2004).

Secondly, in schools, teachers and librarians can and should collaborate on planning lessons and learning activities (Mokhtar & Majid, 2006). This collaboration can effectively draw upon the expertise of each professional – curriculum experience and pedagogical competencies of the teacher; and domain knowledge and library skills of the librarian. Collaborative planned lessons would encompass a more holistic learning approach for students so that they are able to learn and apply IL skills in their curriculum-based subjects seamlessly.

Finally, a more ideal situation would be for schools to have teacher librarians – qualified teachers who are further trained in information studies and library science. These teacher librarians would be able to simultaneously apply their proficiencies in pedagogy and library science in their teaching and integrate IL within the curriculum. Students would truly benefit from this integration. In addition, these teacher librarians can collaborate with or provide assistance to other teachers within the school, especially in weaving IL into various subjects, using the school library in the curriculum, and in selecting and using information sources more effectively. Their grounding in pedagogy puts them at an advantage over school librarians who may not have had any teacher training.

Limitations

First of all, although the study was conducted with more than 250 students, there was a relatively high attrition rate of 28.0% on average, based on the number of students who

answered both the pre- and post-intervention tests. While the results are quite significant and convincing, it would be ideal if the study can be replicated with a larger pool of students, so as to minimize the attrition rate and improve the accuracy of the findings.

Next, even though the content of the IL training course that was given to students comprised the necessary competencies, feedback was obtained that the course should be more interactive and interesting, and that more hands-on sessions should be included. With this consideration, it is recommended that the IL training be carried out more frequently with shorter duration, so as to allow more interactive activities and hands-on sessions to be incorporated. It can be assumed that with more interactive and hands-on activities, the attrition rate can also be reduced.

Finally, due to time and manpower constraints, the study was carried out with 13 to 15-year-old students only. It would be good to extend the study to include both older and younger students. However, this would then require both the IL topics and task requirements to be customised to suit the different levels of student abilities.

Conclusion

Appropriate pedagogical approaches on the part of instructional librarians, teacher librarians, and other IL educators, need to be in place so that IL instruction is entrenched and effective. It must also be recognised that IL education is not meant to be transitory, and that a long-term, continuous IL teaching approach based on sound pedagogy, will be more effective in ensuring that students are equipped with IL competencies and are able to apply them in their school work and beyond.

When instructional librarians, teacher librarians, and other IL educators are able to continuously monitor their students' progress and application of IL skills, and constantly provide many opportunities for those skills to be utilised, then it becomes more conducive for the actual learning of IL to take place. There is no specific pedagogical approach that can be claimed to teach IL most effectively. However, an effort to experiment with the various IL teaching approaches to find one or a combination of a few methods that are best suited to the students that are taught, ought to be made. It is thus recommended that instructional or teacher librarians, and other IL educators be equipped with pedagogical training in addition to their domain knowledge in library and information science, which is, after all, a user-centred and instruction-based discipline.

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