GUIDE ME, SHOW ME: PERSONALISED COACHING AS A MEANS OF INSTILLING INFORMATION LITERACY COMPETENCIES IN STUDENTS

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Abstract

Many studies have revealed that appropriate information literacy (IL) skills can improve the learning process, performance, and achievements of students and ultimately guide them in the desired direction of becoming knowledge workers. However, traditional methods of teaching IL have not always been successful due to several limitations, including short-term effectiveness and shallow application of skills and knowledge. Novel ways of teaching IL need to be experimented with and developed so that IL can be taught more effectively with students having enriched lessons and a more holistic learning experience. This paper provides an overview of a quasi-experimental study conducted with two clusters of 13-year-old students who did a project-based assignment. One cluster of students received personalised coaching (experimental) while another cluster did not receive such coaching (control). The findings of the study show that students who received personalised coaching obtained better scores for their project and showed better mastery of the learning and research process through the ability to use various information sources, present more reliable and authoritative information, and include proper citations and a complete bibliography in their project reports.

Keywords: Information literacy, Pedagogy, Coaching, Mediated learning, Project work, Project-based learning, Instruction

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Introduction

Current teaching strategies in education emphasize independent, resource-based learning and project- or problem-based learning to help students become dynamic and self-directed learners who are ready to venture into and embrace the real world. Many studies have revealed that appropriate information literacy (IL) skills can improve the learning process, performance, and achievements of students and ultimately guide them in the desired direction of becoming knowledge workers. However, traditional methods of teaching IL have not been very successful due to several limitations, including short-term effectiveness and shallow application of skills and knowledge. Novel ways of teaching IL need to be experimented with and developed so that IL can be taught more effectively with students having enriched lessons and a more holistic learning experience.

Literature Review

Information Literacy and Project Work

From as far back as the 1980s, scholars and experts have endorsed the importance of and need for IL in order for individuals to deal with the exponentially increasing onslaught of information (Breivik, 1985; Hubbard, 1987; Mancall, Aaron, & Walker, 1986; US Department of Education, 1983). The mission to equip future generations with IL has been of such prime importance that educational reforms and the increased role of the school library in the school curriculum have been widely proposed and implemented across schools (Breivik & Senn, 1993; Loertscher, Ho, & Bowie, 1987).

Many studies, however, also suggest that students are still not well equipped with crucial IL skills required to meet the demands and challenges in education, especially in this age of information glut. This is particularly true for project-based learning in which extensive research skills need to be employed. More than is usually the case in traditional learning settings, project-based learning allows students to exhibit the range of capabilities they possess (Chard, 2001). Chard, for example, has described project work as an in-depth investigation of a real-world topic worthy of students' attention and effort. Grant (2002) has asserted that project-based learning is centered on students who are more autonomous as they formulate personally meaningful artifacts reflective of their learning. For instance, a group of fifty-four sixth grade students (eleven to twelve year olds) in Canada were

observed as they accessed, interpreted, and used information found on the World Wide Web as a means of completing their project-based class assignment (Bowler, Large, & Rejskind, 2001). It was observed, however, that mere copying of information or ideas and regurgitation of facts were detected in their work. This might be due to students' lacking an adequate understanding of project work as well as to their not possessing appropriate IL skills that would help them conduct their project work more effectively.

Although it is generally believed that IL is useful in developing, facilitating, and supervising project work, limited empirical evidence is available showing the relationship between IL, IL education, and the quality of students' projects. Much research has been produced worldwide and most of the findings have indicated that IL is a much-needed student skill, but little research has been conducted regarding IL teaching approaches (Gibson, 2002; Moore, 2001) or what is termed IL pedagogy. A proper integration of an IL program in the school curriculum would ensure that the acquisition of IL skills is progressive, continuous, and cohesive, while a suitable pedagogical approach in imparting those skills would help ensure that students' interests are heightened and that the learning and application of those competencies are effective and transferable.

Information Literacy and Pedagogy

Teaching IL to students does not involve merely 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 fostering 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 U.S., Australia, New Zealand, South Africa, the U.K., and throughout Europe (Moore, 2002; Rader, 2002; Virkus, 2003).

Consequently, many schools around the world have been outfitted with current information and communication technologies (ICTs) and infrastructures that could enable their students to develop learning opportunities by exploiting these modern tools (Bruce, 2002). Furnishing schools with modern and advanced technological amenities does not, however, necessarily equate to students and teachers being competent enough to effectively utilize tools as information-literate individuals. Both students and teachers

will be able to benefit fully from their learning only when IL instruction that is grounded in sound and effective pedagogy is seamlessly intertwined with the use of ICTs.

Pedagogy and Learning Theories

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

Briefly, the behaviorist orientation views learning as a process where stimuli in the external environment cause a change in the behavior of the learner in a desired direction. Proponents of behaviorism include Watson (1913), who proposed the stimulus-response model and who is regarded as the pioneer of this orientation, and Skinner (1938), who extended Watson's stimulus-response model and proposed the notion of *operant conditioning*.

The cognitive orientation focuses on the learner's internal mental processes of knowing. Renowned theorists in cognitivism include Piaget (1929) and his *genetic epistemology* that concerns the impact of a learner's developed cognitive processes on the acquisition of knowledge; Bruner (1960, 1977) and his theory of constructivism that specifically refers to the formation of new ideas or knowledge based on prior or current ones; and Feuerstein (1980) whose *mediated learning experience* (MLE) suggests that intelligence is dynamic and can be modified if given the right stimulation and environment (through the mediator).

The humanistic orientation is concerned with the affective part or feelings of the learner and also looks at the development of the learner as a whole—the complete intrapersonal growth and not just the cognition. The most famous humanistic theorist is Maslow (1943) who proposed the theory of human motivation, which contends that humans possess four basic or physiological needs that must be met before they can manage to satisfy higher or psychological needs.

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. Eminent advocates of this orientation include Vygotsky (1962) on the concept of the *zone of proximal development* (ZPD), where intelligence is a process activity that is shaped by interactions and experiences, and Bandura (1977) on *observational learning*, or learning through observing what experienced people do. Knowledge of the various learning theories is important in understanding how the teaching of IL skills can be implemented.

Feuerstein's Theory of Mediated Learning Experience

Feuerstein postulates that intelligence is dynamic and modifiable, i.e., that it is not static or fixed from birth and that intelligence can be modified if given the right stimulation and environment (Feuerstein, 1980). These concepts form the basis of his two main theories—theory of structural cognitive modifiability (SCM) and mediated learning experience (MLE).

To be specific, Feuerstein's two theories do not belong exclusively 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) and simultaneously incorporates Skinner's operant conditioning as well as Vygotsky's instructional scaffolding grounded in his theory of ZPD. Although Feuerstein's theory of MLE is not easy to carry out as it involves a deep 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 enhance students' learning as the MLE straddles three orientations of learning theories. This implies that a multi-faceted approach can be effective in helping students learn.

Statement of Problem

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. Existing IL education approaches, however, have not always been very successful in ensuring that students learn and apply IL competencies effectively. 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 work.

Methodology

With this in mind, a quasi-experimental study was conducted with two clusters of 13-year-old students who were initially provided IL training that lasted five weeks. Each cluster of students was then divided into smaller groups of five students each. The students were given a project topic and were supposed to conduct the project as a group. Ultimately, they were supposed to submit a group project report, artifact, and a group oral presentation.

One cluster (experimental) was then closely coached and guided regarding how to apply IL competencies to their project. The other cluster (control) was left very much on their own with minimal supervision. After six weeks, the students were asked to submit their group project report and artifact and present their project as a group.

The group project report, artifact, and group oral presentation were all assessed by three neutral and independent examiners who were not informed of the settings and variables of the research study. Each examiner assessed the group project report, artifact, and group oral presentation based on a prepared assessment rubric.

The assessment rubric consisted of three sections—report, artifact, and oral presentation. The report section was comprised of 17 elements ranging from the selection and evaluation of information sources as well as the use of information and citations to content and overall presentation. The artifact section and the oral presentation section were comprised of four elements each. The assessment rubric was thus made up of 25 elements, with each element to be given a score ranging from one (very poor) to five (very good). A total maximum score of 125 marks was possible for the group project

report, artifact, and group oral presentation. The following gives a diagrammatic illustration of the methodology employed in the study.

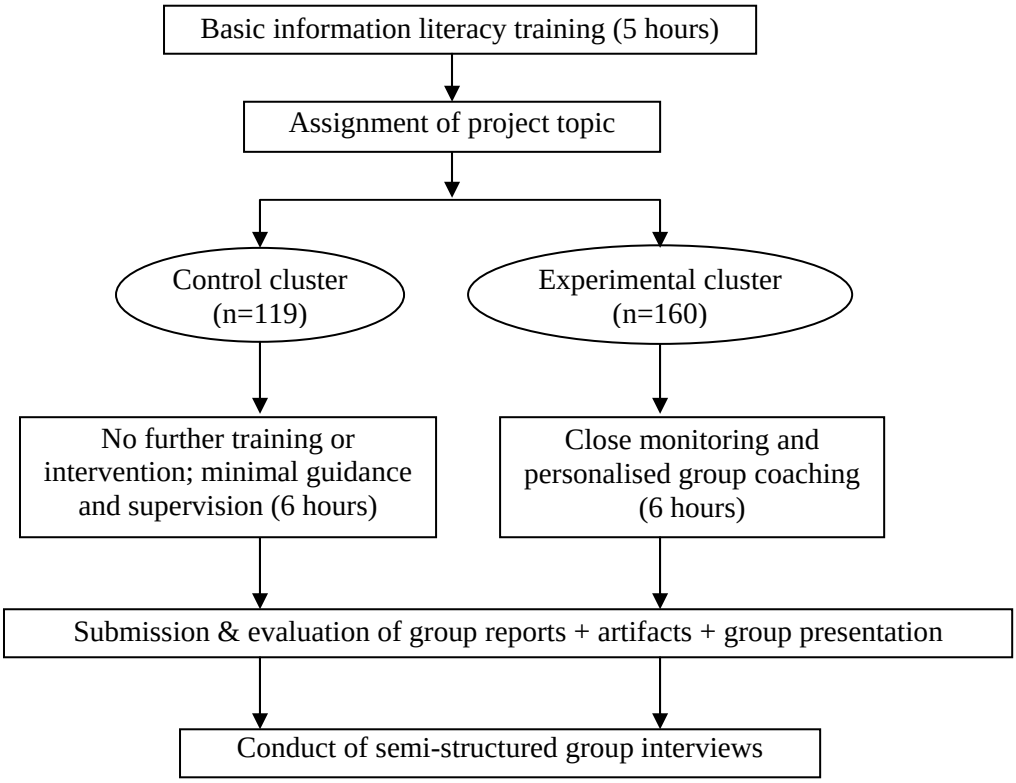


Figure 1: Methodology employed

Demographics

Altogether, there were 279 students who participated in the study. The following table gives the breakdown of the students who belonged to each cluster—either experimental or control.

Table 1: *Breakdown of respondents by cluster*

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

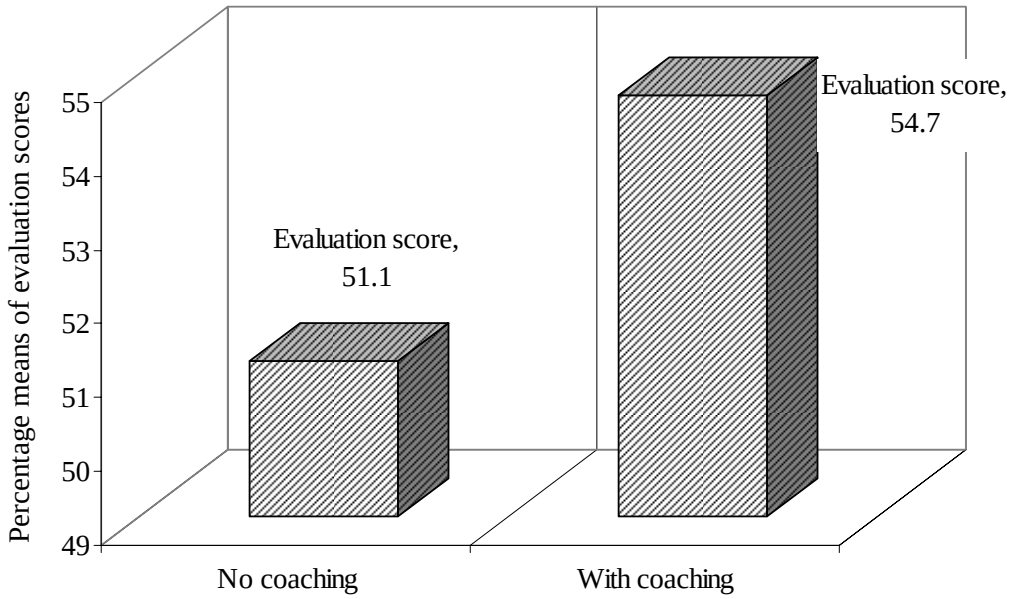
Out of the 279 students who participated in the study, only 179 completed their project work (Table 2). There is thus an overall response rate of 64.2%. As before, quite a substantial proportion of students did not complete their projects. The main reason was because the project work was not part of their examinable curriculum. Also, because it was taught and facilitated by a non-school teacher, students accorded less importance to it.

Table 2: *Number of completed projects*

	No. of students	**Total**	**Percentage**
No coaching	70	119	58.8
With coaching	109	160	68.1
Total	**179**	**279**	**64.2**

Results

The three independent examiners evaluated and scored each of the group projects (with a maximum of 125 marks). Each student thus obtained a group project score, which was the mean of the three scores given by the three examiners. The 100 students who did not complete their projects were given a score of zero. Figure 2 shows the percentage means of the evaluation scores for students who belonged to the two different clusters. An independent samples t-test was performed on the data, which yielded a p-value of 0.002. This value is significant at the 0.05 level.



Evaluation score	**51.1**	**54.7**
Standard deviation	6.61	8.04
Standard error	0.79	0.77

LIBRES ISSN 1058-6768 Volume 17, Issue 2, September 2007
http://libres.curtin.edu.au/

Figure 2: Percentage means of evaluation scores vs. cluster

Four elements in the project assessment rubrics that were completed by the independent examiners were identified as indicative of the IL competencies of students, and these were analyzed according to whether students received close coaching (Table 3). Each element was given a score on a scale of one to five.

An independent samples t-test was carried out on each element, which yielded p-values that are much below the significant level of 0.05, indicating that there are significant differences between students who received close coaching and those who did not.

Table 3: *Analysis of project report, based on cluster*

Report Element	No coaching				With coaching				
	n	**Mean score**	**SD**	**Std Error**	***n***	**Mean score**	**SD**	**Std Error**	***p-value***
1. Use of various information sources	70	**2.2**	0.49	0.06	109	**2.6**	0.61	0.06	*0.000*
2. Use of reliable and authoritative information	70	**2.5**	0.43	0.05	109	**2.8**	0.59	0.06	*0.000*
3. Use of proper citations	70	**2.1**	0.58	0.07	109	**2.4**	0.64	0.06	*0.002*
4. Inclusion of complete bibliography	70	**1.9**	0.48	0.06	109	**2.6**	0.67	0.06	*0.000*

Through simple random selection, one group of students from each class was selected to attend semi-structured group interviews. Their responses to five questions that were asked in the semi-structured interview were collated based on the cluster they were in (Appendix, Table A-1).

From the group interviews, it was generally observed that students seemed to have remembered what they learned during the project. For instance, they said that they learned how to search for information on the Internet, use Boolean operators, use and create bibliographies, be more critical when reading information, and evaluate information from various sources (*"We learnt about using search engines"—Cluster 0, School C; "We learnt how to compare our search results to find the best information"—Cluster 1, School C; "We also learnt about research skills, how to use the Internet more effectively, and how to develop search strategies"—Cluster 0, School D; "We learnt issues such as copyright and how to develop bibliographies"—Cluster 1, School D*).

When asked about the coaching that was provided, students in the control cluster said 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, School C; “We need more coaching”—Cluster 0, School D*). 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. This cluster, however, also mentioned that there should be more coaching and less teaching (“*There should be more coaching and less teaching”—Cluster 1, School C; “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, School D*).

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. If this were the case, they would be given due recognition and credit for their work and also would not have to do additional work in their already intensive curriculum.

Discussion

For the project evaluation (Table 3), students in the experimental cluster achieved better scores (mean = 54.7) compared to those in the control cluster (mean = 51.1). The p-value of 0.002 also shows that the results are significantly different. For the analysis of project report elements (Table 4), it was found that students in the experimental cluster performed consistently better across the four elements compared to the control cluster, with significant p-values obtained for each.

These two measures of project evaluation scores and report elements analysis have sufficiently shown that students who were given close guidance and coaching did better than those who were not given such coaching although both clusters of students went through the same IL training in the beginning. This is a significant finding in that it indicates that IL competencies cannot be sufficiently learned and applied when the knowledge and skills are taught through a one-time training, be it in the form of lecture-

tutorial, workshops, or hands-on sessions. The competencies need to be instilled 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) stated that children naturally 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 children learn and change based on what they discover. He also, however, claimed that youths may not necessarily know the right questions to ask in order to learn and that this strategy needs to be taught. In addition, the information explosion has created the need for more—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 claims are supported by the findings of the study, where it was discovered that close, personalized coaching or mediated learning makes a difference in how students perform in an IL-based project.

Thus the role of a coach or mediator—one who is able to ask the right questions for students to reflect on their learning and who can then guide the learning process—makes a significant 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. Hence, in this study, students were able to retain the IL competencies they learned from the IL training sessions and were better able to apply these competencies in their project reports through the questions posed by the mediator or coach. Similarly, these students showed a better mastery of the research process as exhibited in the quality of their written reports vis-à-vis the use of various information sources, use of more reliable and authoritative information, and inclusion of proper citations and a complete bibliography.

Implications

From the findings of this study, it can be argued that the application of learning theories to facilitate learning helps in improving the quality of students' work. Just as teachers have different teaching styles and preferences (Smith, 2005), students also have their respective learning styles and preferences, which greatly shape the way they learn and how much they retain and are able to apply. It is thus important to recognise and understand the different approaches to teaching and learning. In the area of information studies and library science, this has significant implications for instructional librarians and IL educators in particular. Other than being equipped with domain knowledge in the discipline of information studies and library science, instructional librarians and IL educators must also be equipped with such pedagogical competencies (Rockman, 2004) as learning theories and styles 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, IL policy-makers should consider including pedagogical knowledge and skills training in information and library science training. Since training in information and library science ultimately entails a service that is provided to information and library users and that includes instruction on information and library use, it is only sensible that pedagogy should form a foundational component.

Finally, 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 as well as domain knowledge and library skills of the librarian. Collaboratively planned lessons would encompass a more holistic learning approach for students so that they are able to learn and apply IL skills seamlessly in their curriculum-based subjects.

Limitations

One of the most significant limitations of this study was that it was conducted with only a couple hundred students. There was a relatively high attrition rate of 35.8%, based on the number of students who completed their projects. Although the results are quite

substantial 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.

Next, although the content of the IL training course given to students covered 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 and 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 be reduced.

Finally, due to time and manpower constraints, the study was carried out with 13-year-old students only. It would be good to extend the study to include both older and younger students. This would, however, require that both the project topics and requirements be customized to suit the different levels of student abilities.

Conclusion

Appropriate pedagogical methods and close monitoring of the learning process on the part of IL educators need to be in place so that IL instruction is ingrained and effective. It must be realized that IL education is not meant to be ephemeral and that a long-term, continuous IL teaching approach based on sound pedagogy will be useful in ensuring that students are equipped with IL competencies.

When IL educators are able to continuously monitor their students' progress and application of skills and constantly provide opportunities for those skills to be utilized, then the actual learning of IL is able to take place. There is no specific pedagogical approach that can be claimed to teach IL most effectively. IL educators, however, ought to make an effort to experiment with various approaches in order to find one method or a combination of methods best suited to the students that they teach. It is thus recommended that IL educators be equipped with pedagogical training in addition to domain knowledge in library and information science, which is, after all, a user-centered and instruction-based discipline.

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APPENDIX

Table A-1*: Responses from semi-structured group interviews*

Questions	Cluster	Responses
1. What do you think of your recently completed project on recycling?	0	▪ Interesting. But it was difficult to understand instructions because most of the time the class was noisy. ▪ Topic is OK. Not too difficult or too easy. We had enough freedom to choose what we wanted to do. ▪ Not enough time to complete the project. ▪ It was manageable. ▪ It was time-consuming, especially in finding resources for the project. ▪ It was OK. ▪ It was difficult to find information from the Internet, compile the information and write the report.
	1	▪ We had too many things to do and too little time. ▪ We have a lot of other activities and projects as well. ▪ We have too many things to do. It was stressful. ▪ We spent too much time on it. ▪ It was OK.
2. What have you learnt in doing this project?	0	▪ We learnt about teamwork, about recycling. ▪ We learnt about using search engines. ▪ We also learnt about developing search strategies. ▪ We learnt how to care for the environment. We also learnt about research skills, how to use the Internet more effectively, and how to develop search strategies. ▪ We learnt how to use different types of search engines. ▪ We learnt about saving the environment, how to conduct online searches, and also learnt about copyright issues. ▪ We learnt how to use different search engines, finding information from Web, and how to use Boolean operators.
	1	▪ We learnt about search skills, such as using AND, OR, NOT operators (Boolean). ▪ We learnt how to evaluate and compare our search results. ▪ We learnt about teamwork, how to use search engines, and how to use Boolean operators. ▪ We learnt searching skills. ▪ We learnt issues such as copyright and how to develop bibliographies. ▪ We learnt about teamwork and cooperation. We learnt about using search engines and databases. ▪ We learnt how to compare our search results to find the best information.
3. What are some things that you think you can apply in other subjects/ disciplines/ projects?	0	▪ Reliability of information; how to check if the information we get is reliable. ▪ Looking up information using search engines. ▪ We can use the research skills we learnt in subjects such as science or geography; practically any other subjects especially project work. ▪ We can use the skills we learnt in finding information when doing our science projects. ▪ We can use the search skills we learnt in other subjects, such as in

Questions	Cluster	Responses
		history when we do our research.
	1	▪ We can transfer the search skills that we learnt as well as leadership skills that we picked up. ▪ We can use the searching skills in subjects such as English or geography; basically subjects that require research to be done. ▪ We can use the searching skills in geography. ▪ We can transfer skills such as finding information and using Boolean operators.
4. What do you think of the coaching provided by the instructor?	0	▪ There should be more time for coaching us. ▪ There should be less time allocated to teaching us the skills and more time allocated to coaching us. ▪ We need more coaching. ▪ We think it will be useful. There should be more coaching to help us understand better. ▪ We should have more coaching to help us do our project.
	1	▪ The coaching was quite useful. It provided us with more guidance and understanding to do our project. ▪ It was very useful. We were lost at first, but the coaching helped to guide us in doing our project. There should be less teaching and more coaching. ▪ We knew what to do. ▪ The coaching was useful. There should be more coaching and less teaching.
5. What are some changes that you would recommend to improve the way that the lessons are taught or the way the project is developed by the instructor?	0	▪ There should be more time for us to do the project. ▪ It should be made more interesting and exciting. There should be more hands-on sessions or activities. It should also be done within school hours. It is too tiring to attend lessons after school hours. ▪ Having the lessons after school is OK. ▪ There should be more hands-on sessions, more games. The lessons should be made more interesting.
	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. ▪ The project work should be incorporated within the curriculum. Maybe it can be done during the holidays even. ▪ It should be part of our examinable curriculum. There should be more hands-on activities and less teaching or lectures. ▪ The lectures were too long. There should be more hands-on activities. ▪ More hands-on sessions should be included. Maybe lessons can be held in the computer labs.

0: control cluster; 1: experimental cluster