

## Development of the Instructional Model by Integrating Information Literacy in the Class Learning and Teaching Processes

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### ABSTRACT

This study was aimed at developing an instructional model by integrating information literacy in the instructional process of general education courses at an undergraduate level. The research query, "What is the teaching methodology that integrates information literacy in instructional process of general education courses at an undergraduate level?" was set with an aim to develop the teaching methodology that integrates information literacy in instruction of general education courses of undergraduate curricula. The research method was based on the quasi-experimental design and the nonrandomized control group pretest-posttest design. The two general education courses under study included SWU 142 Sciences for the Development of Quality of Life and the Environment and *SWU 151 General Studies for Human Development*. The research was divided into 4 stages: (1) The teaching plan involving the outcomes of information literacy acquisition in the general education courses was analyzed and written so that it integrated information literacy. (2) The knowledge and competency related to student information literacy were measured before and after the experiment using an information literacy proficiency test. (3) The teaching was conducted according to the teaching plan. (4) The case study reports by the students where information literacy skills were applied were evaluated by the teacher. The findings indicate that instruction which integrated information literacy of the two general education courses comprised 8 components: the learning outcomes, teaching method, learning activities, teachers' roles, librarians' roles, students' roles, teaching media, and learning assessment and evaluation. The instruction that integrated information literacy involved seven steps: assignment of case studies, selection of case study topics, retrieval of related information, stipulation of teaching topics, self-access learning, research presentation, and evaluation of the case studies. The experiment on the developed teaching approach in the courses SWU 142 and SWU 151 indicated that the experimental groups of both courses showed a higher level of information literacy and higher scores of group assignments after the experiment.

**Keywords:** Instructional model; Information literacy; Information literacy integration; Learning and teaching processes; General education courses

### INTRODUCTION

The development of high quality graduates is an important higher education issue due to the employment market demand and changing work conditions. University graduates are expected to possess broad knowledge in their disciplines, communication skills, analytical and problem-solving skills, and informational skills. They also are expected to be qualified as people. They must have, for example, morals, ethics, and a sense of responsibility. There are various ways to instill these qualifications through classroom instruction. Information literacy is an instructional method that aims to develop the skills and qualities expected by society and employers. However, the development of information literacy in undergraduate students varies from one university to another in Thailand. The incorporation of information literacy courses in the curriculum, short training courses, library orientation, and e-learning programs for self-access learning are some examples of this. Attempts have been made to integrate techniques such as problem-based learning, active learning, and student-centered learning in taught courses. The integration of information literacy in the various undergraduate courses enables students to acquire information skills and apply the knowledge continuously both during their undergraduate studies and beyond.

General education courses emphasize elements that can be applied in daily life, promote knowledge acquisition processes and provide broad perspective contents. Most of the contents of these courses are integrative. However, the present instructional situations of the general education courses still rely on lecturing with few self-learning activities and lack analytical

practices (Sinlarat, 2007). Lecturing may not be successful in forming the above-mentioned qualities as expected. Teaching approaches should be improved by adding more learning activities that emphasize self-learning. The teaching approach that integrates information literacy is an instructional method that involves various teaching and learning activities as well as collaboration between the content-specialized teacher and the information-specialized librarian. Thus, this study was aimed at developing an instruction model for general education courses at the undergraduate level by integrating information literacy. General education courses taught at Srinakharinwirot University were the study cases due to the fact that these courses have already been integrated with information literacy, especially the course SWU 141 Information Literacy Skills where the teachers and librarians have been collaborating in the instruction.

## **RESEARCH OBJECTIVE**

This research was aimed at developing an instructional model that integrates information literacy in instructional process of general education courses at the undergraduate level.

## **LITERATURE REVIEW**

### ***Integration of Information literacy in the Course Level***

The integration of information literacy in curricula means applying varied teaching approaches and responding to learning through the use of multiple models. Information literacy from assignments and appropriate real life experiences are linked together (Association of College and Research Libraries (ACRL)'s Institute for Information Literacy, 2003). Information literacy integrated in courses is an efficient model because information literacy is taught as part of a course or as an assignment in the course (Fitzwater et al., 2003; Eisenberg, Lowe, & Spitzer, 2004). This type of instruction accents student awareness of the importance of information literacy according to the information capacity standard. Students' capacity in this respect varies according to the requirements of each course and the ability of the students themselves (Fitzwater et al., 2003; Andretta, 2005). Integration of information literacy in a course facilitates the advancement and continual development of learning opportunities. Information literacy that has been integrated and linked to course content is an important learning tool. The teacher usually decides on learning activities and assignments that provide information skills in the course objectives. The teacher and the librarian cooperate in teaching and evaluating the students' information skills (Fitzwater et al., 2003).

In the conceptual framework that explains the integration of information literacy, Irving's study on information skills across curricula is the model that assists students in fulfilling their course assignments. It connects the information skills with various activities in which the skills occur in the learning tasks as real life skills which significantly lead the students to succeed in their assignments or projects. The model is composed of nine steps: defining tasks, considering sources, finding resources, making selections, effective use, making records, making sense, presenting work, and assessing progress (Irving, 1985). However, the integration of information literacy, in which it is emphasized that the assignments correlate information literacy to the skills learned in the course, is one that involves a test of students' informational capacity. The students are required to do a pre-test before learning about information literacy in 2 to 3 sessions. The content includes library and database searches related to the course and linked to the assignments. When the teaching is completed there will be a post-test (D'Angelo, 2001; Brown, & Krumholz, 2002; Sugarman, & Mosby, 2002; Paglia, & Donahue, 2003; Tucker, & Palmer, 2004; Williams, Blowers, & Goldberg, 2004; Bowler, & Street, 2008). This instruction model is useful for the teacher because information literacy is integrated into the course content during the teaching and especially in the assignments where the integration is more evident. The teaching of information literacy is also useful for the librarian in recommending information resources to the teacher and to the students for their studies (Dakshinamurti, & Horne, 2006).

Curricular integration is a means that enhances the student-centered approach, especially the problem-based learning, where students practice goal-based reasoning, which gives them a better understanding of the course content than the lecturing approach. Students

require reasoning skills to figure out the information resources. At the same time, they take more responsibility for self-learning which augments their independence. The instruction is collaborated by the teacher and all relevant personnel (ACRL, 2000). The problem-based lesson plans are comprised of five components, namely: (1) the learning target, (2) the learning objectives, (3) the teaching procedures – the teacher introduces various case studies, each group of students analyzes its own problem that leads to an information search, determines information needs and a plausible solution to the problem. The teacher introduces various information sources and the students search relevant sources that support their assumptions, (4) learning evaluation tools, and (5) teaching evaluation by the teacher himself (Macklin, 2001). There are five practices required for integrating information literacy: (1) Designing interesting problems as a learning mechanism that will lead the students to achievement, (2) Group work and discussion of each student's knowledge about the problem, which leads them to determine the information sources to be collected for the solution, (3) Question posing by the teacher so that students select reasonable information sources which are appropriate for their problem solution, (4) Student access to the selected information source or to the sources and resources prepared and provided by the teacher and the librarian, (5) Support from the teacher and follow-ups to the students' work by integrating information literacy into the class assignments (Enger et al., 2002). The studies and research of Schilling et.al. (1995); Eldredge (2004); Williams, Blowers, & Goldberg (2004) and Bowler, & Street (2008) reveal that the integration of information literacy is most effective when students are divided into groups of not more than 10. Each group is presented with a real or simulated problem, proceeds with an information search, references problem-solving information, thinks together, compiles problems, builds assumptions, and concludes the learning issues. The teacher and the librarian provide consultation during the students' work. The study of Enger et al. (2002) also found that librarians have a role in preparing information resources that support the problem-setting of the students. They also teach the students information literacy so that the students will obtain the accurate information resources for their problems and use these resources efficiently.

### ***Integration of Information literacy in the General Education Course***

The integration of information literacy is usually done in general education courses that account for a high number in any one curriculum, however with different emphases. The teachers and the librarians work together to plan the information literacy instruction and assignments (Curzon, 2004). The study of Sonntag, & Ohr (1996) exhibits the formation of a working team for a university's general education courses where librarians have been appointed a member. In instruction management, the librarians develop the program aims and objectives by means of the ACRL's Model Statement of Objectives for Academic Bibliographic Instruction, in which the aim, objectives, and performance of each course are separated. The study by Higgins, & Cedar Face (1998) on a first year general education course aiming at the development of writing, speaking, and analytical thinking, reveals the integration of the following three major aspects in the information literacy instruction: (1) The aims and objectives include the instructional scope, content, teaching approaches, evaluation, and the development of assignments. (2) The teaching team of 4-5 teachers meets for brainstorming every fortnight to improve class instruction. (3) The teaching is student-centered, emphasizing self-learning and assignment. Each assignment or report and presentation is to be assessed. The librarian teaches 4-5 sessions covering the research strategy, selection and assessment of information resources, and appropriate presentation of information. Hiscock, & Marriott (2003) exhibited the instruction in which the librarian applied the Foundation Course Portal as the instructional resource. The content is based on the fundamental computer use, information retrieval, information assessment, referencing, databases and search engines. The students perform their assignments in various patterns and then present, report, analyze, discuss and answer questions in their class. The study of Ojedokun, & Lumande (2005) shows the teachers of general education courses collaborating with librarians in the application of WebCT instruction management in order to deal with a large number of students.

The following researchers conducted studies on the integration of information literacy in general education courses and the level of information literacy as an outcome. Brown, & Krumholz (2002); Williams, Blowers, & Goldberg (2004) and Bowler, & Street (2008) have found that the integration of information literacy results in a higher level of information knowledge.

Students are more confident to study and research on their own. Sugarman, & Mosby (2002) indicated that students learn how to use information more. Hiscock, & Marriott (2003) also reflected that students acquire more research skills especially from self-access learning courses. In terms of learning outcomes from assignments, Ursin, Lindsay, & Johnson (2004) found that students learn how to work well as a team on assignments and activities. Paglia, & Donahue (2003) have shown that students can apply information skills required in the course in the presentation of their research report at a high level. Bowler, & Street (2008) also showed that students' information skills increase from the written and problem-based assignments.

## RESEARCH METHODOLOGY

The development of an instruction model by integrating information literacy in undergraduate general education courses was based on the Quasi-experimental Design and the Nonrandomized Control Group Pretest-Posttest Design. Two general education courses were involved: *SWU 142 Sciences for Life Quality Development and Environment* and *SWU 151 General Education for Human Development*. The students in each course were divided into two groups, the experimental group and the control group. The study was divided into 4 stages: (1) building the teaching plan and instructional materials, (2) measuring the students' information literacy, (3) teaching according to the teaching plan, and (4) evaluating the learning outcomes.

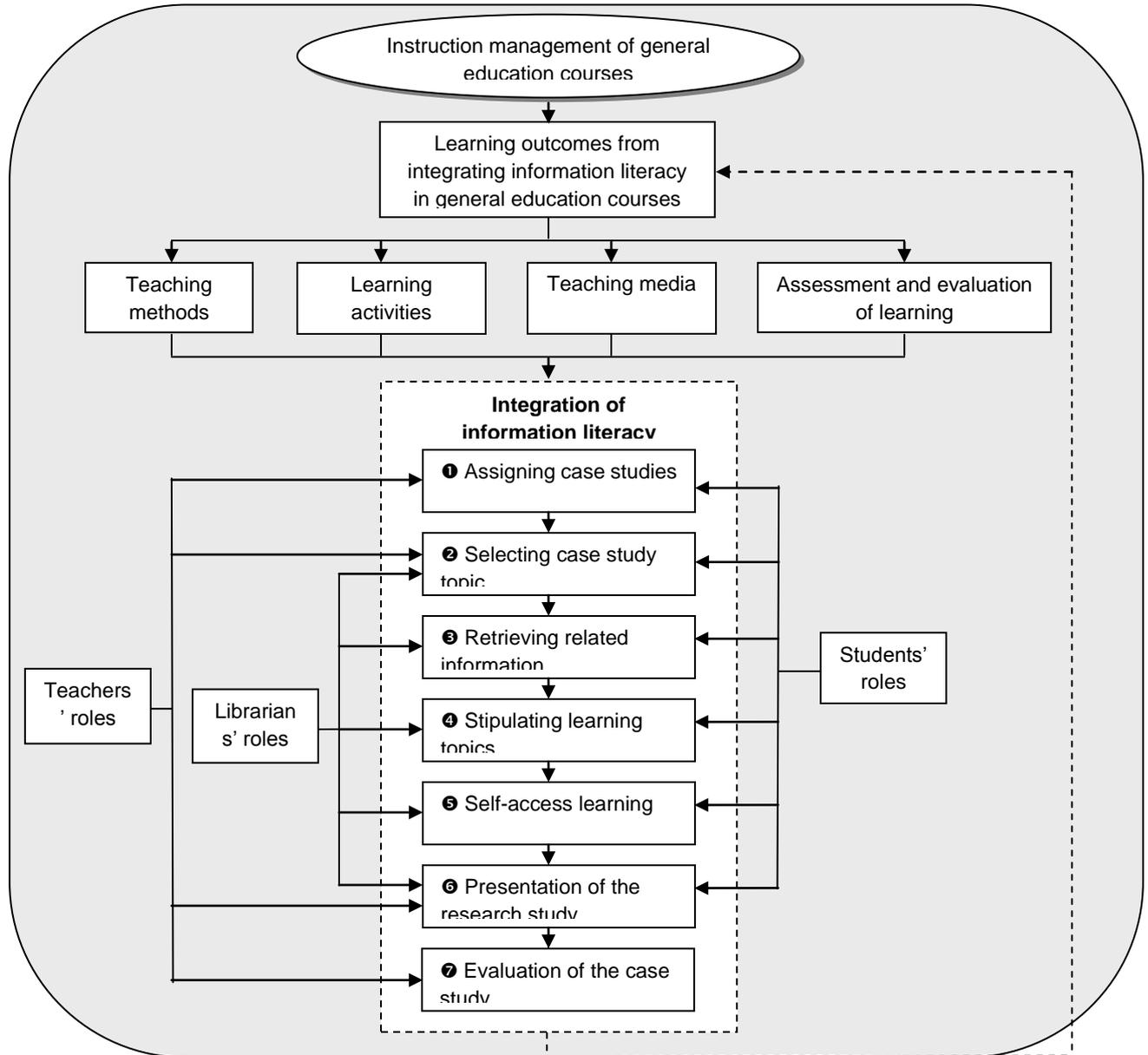
The samples under study were as follows: In SWU 142, there were two teachers, two librarians, 95 students in the control group and 66 students in the experimental group. In SWU 151, the samples included two teachers, two librarians, 88 students in the control group and 103 students in the experimental group. The research tools included the following: (1) Information literacy-integrated teaching plans comprising integrating units, learning outcomes, teaching methods, learning activities, teachers' roles, librarians' roles, time frames, teaching media, assessment and evaluation. (2) Information literacy pre-test and post-test in a 40 multiple-choice (5 choices) item type and true-false item type totaling 40 points. This is under the ACRL information literacy standard with the difficulty levels between 0.20 - 0.70 and the discrimination values between 0.21 - 0.65. The test reliability was based on Cronbach's Alpha Coefficient of 0.801. (3) The record form for recording the teaching behaviors of the teachers and the learning behaviors of the students, namely: teaching methods, learning activities, teachers' roles, librarians' roles, students' roles, teaching media, assessment and evaluation. (4) The record form for recording the librarians' roles in supporting the teaching. The activities could take place during class or in the library. (5) The student report evaluation form to be filled by the two teachers who taught the class and another teacher who was invited as a neutral evaluator. The evaluations were based on five criteria, each accounting for 4 points and totaling 20 points: selection of the study topic, setting of the overall concept of the study topic, selection of information sources, analysis of information for reporting, and referencing at the end of the report. The 4-scale rating format was used; with 4 for very good, 3 for good, 2 for fair, and 1 for items requiring improvement. (6) The instruction materials for information literacy acquisition were composed of 4 topics: stipulation of the information scope relevant to the study topic, stipulation of information searching and retrieval, summarizing of the main ideas of the information pieces, analysis and synthesis of information, and the use of information in organizing and presenting the study topic. The researchers collected the data in the classes from June to August 2010.

The collected and compiled data were analyzed from the results of the information literacy pre-test and post-test to calculate the averages, standard deviations, and Independent Samples T-test. The evaluation data from students' reports were computed for the averages, standard deviations, and Mann-Whitney U Test. Content analyses were applied in managing the data obtained from behavioral observations conducted on the teachers, students, and librarians.

## RESULTS

The instruction model with the integration of information literacy developed in this study is presented in a flow-chart format in Figure 1. It should be explained that the instruction of each general education course had different goals stipulated for the students' learning outcomes. The teachers began by analyzing the outcomes of information literacy learning prior to deciding on

the teaching methods, learning activities, teaching media, assessment and evaluation of learning. Next, the seven steps in information literacy were integrated in the instruction. The roles of the teachers, librarians and students differed in each integrating step. The outcomes of information literacy integration would reflect the students' information literacy levels and the outcomes of the integration of information literacy in the instruction.



**Figure 1: The Instructional Model for Integrating Information Literacy in the Class Learning and Teaching Processes *Elements of the Instructional Model***

The findings indicate that the instructional model with integrated information literacy in classrooms was composed of the following eight components:

1. Learning outcomes – The ability of students to set the characteristics and the scope of information relevant to the study topic, strategies for searching and retrieving information and adjusting the strategies in order to obtain the required information, summarizing the main ideas of the obtained information, analyzing and synthesizing information in order to create new concepts and information, and using information to organize and present the research study.
2. Teaching methods – Lecturing co-taught by the librarians, demonstration of information retrieval methods, small-group teaching, problem-based teaching or case-studies, and self-access learning.
3. Learning activities – Working on the assigned case studies, brainstorming among group members, self-access learning by members, posing of questions by the librarians and answering of questions by the students on the relevant topic, assessing and using information, writing and reporting the study topic, and consulting on information retrieval with the librarians.
4. Teachers' roles – Preparing case study assignments as group work, providing advice for students in topic selection, evaluating the learning outcomes from the students' group report.
5. Librarians' roles – Teaching students information literacy that is related to the studied topics and the assignments, introducing information sources, information resources, and library services, and giving advice and assistance by teaching information retrieval methods.
6. Students' roles – Surveying information from various sources, posing questions on the learned topics, searching on information related to the learned topics, discussing and exchanging opinions among group members, self-access learning, presenting found information on the study topic, conducting assignments.
7. Teaching media – Instructional materials on information literacy acquisition, teaching support websites on assignments with sample reports, website information, external learning sources, presentation programs used in lecturing by the teachers and the librarians.
8. Learning assessment and evaluation – using the information literacy pre-test and post-test and evaluating the students' research reports by the teachers.

### ***Learning and Teaching Processes***

The study shows that the instructional model with the integrated information literacy in classrooms was composed of seven steps of integration:

1. Assignment of case studies – The teachers assigned the students in groups of 10 to select a topic for their case studies within the scope of the course content and then assigned the responsibilities of each member.
2. Selection of the case study topic – Each student group brainstormed for the study topic. The librarian came to the classrooms to teach information literacy in the topic of setting characteristics and scopes of information related to the study topic. The librarian then asked each group how they selected their case study topics so that advice could be given on improving the topics. Next, each group presented a case study topic to the teachers for further improvement or adjustment.
3. Searching on related information – Each group of students divided responsibilities in searching on information related to the case study from various learning sources as assigned. The librarians taught information literacy to the students in their class on the topic of setting the searching and retrieval strategies and demonstrated how to retrieve information from different sources.
4. Setting learning topics – The librarians came to the class to teach information literacy on the topic of summarizing the main ideas of information and analyzing and synthesizing information. Then the students compiled all of the information collected by

- each group member in order to set the learning topic that covered the case study and its scope as stipulated by the teachers.
5. Self-learning – The students as group members learn by themselves from various learning sources in order to collect information related to the learning topic. The librarians provided advice on internal and external information retrieval. Then each group of students met to summarize the learning topic each had researched and brainstorm their opinions on the study case from the collected information.
  6. Presentation of researched results – The librarians came to the class to teach information literacy on the use of information in organizing and presenting the report. Each student group then drew conclusions from the information and presented them in the scope of their learning topics. The presentations were made in front of the class for approximately 10 to 15 minutes, with the teachers providing comments and feedback. Finally, the students handed in their case study project.
  7. Evaluation of the case study – The teachers evaluated the case study project of each group of students according to five criteria, namely, choice of the case study topic, conceptual approach to the study case, the selection of information used for the study and referencing, the synthesis of information for report organization, and references in the body and at the back of the report.

### ***Implementation of the Instructional Model***

#### ***1. Pre- and Post-Measurement of Information Literacy***

The developed instruction model was experimented in the class after the students' information literacy levels were measured based on the five standard information literacy criteria as follows: the stipulation of characteristics and scope of information, access to information, evaluation of information, use of information, and understanding of ethics and laws related to the use of information. It was determined that the levels of information literacy of the students in the experimental and control groups studying SWU 142 Science for Life Quality Development and Environment and SWU 151 General Education for Human Development before the experiment, in total and aspect by aspect, differed with no statistical significance. After the experiment, however, the two groups showed differences in information literacy with statistical significance for both courses. The experimental groups showed higher levels of information literacy than the control groups ( $p < 0.05$ ). When considering information literacy of the students aspect by aspect, it was found that the experimental group of SWU 142 Science for Life Quality Development and Environment had higher levels of information literacy after the experiment in the stipulation of characteristics and scope of information, access to information, and understanding of ethics and laws related to the use of information than did the control group with statistical significance ( $p < 0.05$  for all). The experimental group of SWU 151 General Education for Human Development had higher levels of information literacy in the stipulation of characteristics, scope of information, and access to information than did the control group at a statistical significance of  $p < 0.05$  for both.

#### ***2. Evaluation of Students' Learning Outcomes***

The group reports of the experimental and control groups of SWU 142 Science for Life Quality Development and Environment and SWU 151 General Education for Human Development were evaluated using the following five criteria: the choice of case study topic, the conceptual approach to the study case, selection of information used for the study and referencing, synthesis of information for report organization, and referencing in the body and at the back of the report. The study revealed that the teachers and the evaluator rated the overall information literacy in the reports of the two groups differently with statistical significance. The experimental groups were rated higher in all aspects of the reports both by the teachers and the evaluator than were the control groups (Mann-Whitney U Test,  $p < 0.05$ ). The reports were considered aspect by aspect and the results showed that the experimental group of SWU 142 Science for Life Quality Development and Environment obtained greater scores than did the control group in

terms of setting the case study topic with statistical significance (Mann-Whitney U Test,  $p < 0.05$ ). The control group of SWU 151 General Education for Human Development received higher scores than did the control group in setting the concept that covered the study case, the selection of information used for the study and referencing, and referencing in the content and at the back of the report with statistical difference (Mann-Whitney U Test,  $p < 0.05$  for all).

## DISCUSSION

The instruction model that integrated information literacy in undergraduate general education courses emphasized problem-based learning as part of the instruction. The assigned problems were designed to be investigated through case studies where class instructions were geared towards small-group learning and individual self-learning. Two more teaching methods were incorporated by the librarians who participated in the courses, i.e., lectures co-taught by a librarian and demonstrations of information retrieval methods, which matched the concept proposed by ACRL (2000), where information literacy is integrated via well designed problems. Students are enabled to improve their self-thinking and self-learning skills. However, instructional management has to be cooperated by relevant personnel. This correlates with the studies of Schilling et.al. (1995); Eldredge (2004); Williams, Blowers, & Goldberg (2004) and Bowler, & Street (2008), which state that the integration of information literacy is aimed at enabling students to research on real or simulated problems through their small groups, via searches of relevant information, and with consultative support from teachers and librarians.

The integration of information literacy through assignments designed around the course content provided opportunities for students to search information and write research reports. This finding is in line with the research work of D'Angelo (2001); Brown, & Krumholz (2002) Sugarman, & Mosby (2002); Paglia, & Donahue (2003); Tucker, & Palmer (2004); Williams, Blowers, & Goldberg (2004) and Bowler, & Street (2008) where assignments emphasized the integration of information literacy with the course content. In these studies, seven steps of information literacy integration were mentioned: assigning study cases, selecting case study topics, retrieving related information, setting learning topics, self-learning, presenting researched results, and evaluating case studies. The model suggested in Irving's study and information skills across the curriculum has four similar steps, namely, defining tasks, finding resources, presenting work, and assessing progress. Hence, our research study emphasized the two extra steps of setting learning topics and self-learning, in which students retrieve primary information on the study case topic as well as from their learning topics and the information obtained from the teacher. Each group member then learns through searching and compiling relevant information.

The developed instruction model was tested in the courses *SWU 142 Science for Life Quality Development and Environment* and *SWU 151 General Education for Human Development*. The students in the experimental groups of both courses showed higher levels of information literacy than the students in the control groups. Our findings correlate with the work of Brown, & Krumholz (2002); Williams, Blowers, & Goldberg (2004) and Bowler, & Street (2008) who found that the integration of information literacy increases students' competency in this connection. The experimental group in the course SWU 142 was instructed on the stipulation of characteristics and scope of information that matched the study case topic and the search and retrieval strategies. As a result, the information literacy levels of this group were higher than in the control group. The students in this group even outdid their counterparts in the aspects of information access and understanding of information-related ethics and laws. These two aspects were not covered in the teaching plan, but the librarian tried to add the content during the lessons, especially the importance of referencing. The experimental group in the course SWU 151 showed higher information literacy levels than the control group in stipulation of characteristics, scope of information and information access. The students in this group were taught by the librarian to set the search and retrieval strategies. Information access was not added in the teaching plan; however, the librarian incorporated the issue in information searches of the students' study topics.

Evaluation of the students' learning outcomes from group reports was conducted by the teachers and the evaluator. The students in the experimental groups had higher scores in all

aspects of information literacy than in the control groups. The research work by Paglia, & Donahue (2003) also proved that students were able to apply their information skills to present their report at a high level due to the fact that they have learned information literacy and applied the knowledge in their assignments. Our findings show that the experimental group in SWU 142 scored higher in information literacy from their report work by the teachers because they learned how to set the characteristics and scope of their study cases. They had to conduct their work in accordance with the content topics. The students in the experimental group in SWU 151 were rated by the teachers and the evaluator in setting related concepts, selecting information for the study, and referencing the content and the last part of the report. Their scores were higher than the control group's because they were taught the topic of the stipulation of characteristics and scope of information that matched the study case topic, the stipulation of search and retrieval strategies, and the use of information in organizing and presenting the report.

The results of this study indicate that the integration of information literacy in the instruction of general education courses could be implemented in four topics out of 5 as stated in ACRL's information literacy standards, i.e., the stipulation of characteristics and scope of information, information access, information evaluation, and information use. The only remaining topic, the ethics and laws related to the use of information, could not be implemented because the teachers might have thought that the content was already incorporated in the teaching. In particular, there were learning activities where the teachers aimed at promoting ethics and moral by asking the students to discuss issues from video presentations and through a volunteer project. Thus, the learning outcomes in information literacy from the developed instruction model could be said to achieve the four aspects of capacities in stipulating characteristics and scope of information, in information access, information evaluation, and information use.

## **CONCLUSION**

This study presents the instruction model that integrates information literacy into two undergraduate general education courses. The model is composed of eight components: learning outcomes, teaching methods, learning activities, teachers' roles, librarians' roles, student's roles, teaching media, and learning assessment and evaluation. The teaching involves 7 steps: assigning study cases, selecting study case topics, retrieving related information, setting learning topics, self-learning, presenting results of study, and evaluating case studies. The experiment was conducted using the developed instruction model in two general education courses, *SWU 142 Science for Life Quality Development and Environment* and *SWU 151 General Education for Human Development*. The findings indicate that the experimental groups of both courses showed higher information literacy levels after the experiment and higher report scores than the control groups, proving that their information literacy increased. However, the developed model was a case of Srinakarinwirot University, where the context of the management of general education courses involves personnel from various sections. This is particularly true for the course *SWU 141 Information Literacy Skills*, which requires cooperation between the teacher and a librarian. Hence, the introduction of this model in other places should be done with assignment-based courses. The assignments should be aimed at students' searching of information for their studies on the selected topic from various learning sources.

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