

A Project entitled

Integrating information literacy skills and knowledge into ICT lessons: An exploratory study

Submitted by

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Declaration

I, *Chung Wing Tung* declare that this research report represents my own work under the supervision of *Dr. Lai Yiu Chi*, and that it has not been submitted previously for examination to any tertiary institution.

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8 April 2021

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Abstract

Information is becoming more critical in this digital society. Encountering the information explosion with fake and misleading information, information literacy (IL) becomes indispensable for every citizen to process and evaluate information efficiently. Indeed, it is essential to put IL in the secondary ICT curriculum to ensure students abilities in their lives. In this study, an exploratory study was conducted by integrating IL into junior secondary ICT lessons to investigate the effectiveness of the integration. During the study, two classes of secondary three students participated in the integration in their regular ICT lessons. Students needed to complete a pre-test, post-test, and survey after four lessons of integrating IL into ICT lessons. Class observation and interview were also processed. In brief, the results showed that it is effective to integrate IL into ICT lessons. All the IL areas should be included in the curriculum to enhance students' information literacy efficiently and apply it in different situations.

Keywords: Information literacy; junior ICT curriculum; Information technology

1. Introduction

Since the wave of globalization, the promotion of ICT and the reform and changes of the global economy are changing the world constantly, information becomes indispensable in our daily life (Dudziak, 2007). However, the massive information flow causes an information explosion with much fake information to mislead the whole society in all age groups.

Therefore, Information literacy (IL) is urgently needed for the whole society to encounter the information explosion and fake news generation for distinguishing accurate information.

Indeed, the existing secondary curriculum and the future curriculum do not provide enough time for students to enhance their IL skills. Starting from the coming 2022-2025 senior secondary ICT curriculum, the lesson hours for social implications will be reduced from 22 hours to 8 hours (Curriculum Development Council & the Hong Kong Examinations and Assessment Authority, 2015; Education Bureau, 2020). It reveals that there is not enough time to cover all the necessary social implications content, especially information literacy skills. Therefore, it is necessary to raise the lesson hours for information literacy skills and knowledge in junior forms to recover time loss in the new curriculum to help students encounter the information in their daily lives. The following part would discuss the feasibility of integrating IL skills and knowledge in junior ICT lessons by the implementation of

integrating the content about the skills and knowledge of IL in the normal ICT lessons in the junior secondary grade for four weeks.

2. Literature Review

2.1 Definitions of Information literacy (IL)

According to Farmer and Henri (2008), a person to be information literate can recognize information. However, there is no unique definition of information literacy. Several scholars pointed out there are various interpretations in different contexts, such as education, economics, politics, and culture. Integrating the interpretations from different authorities, IL is the ability to identify, locate, evaluate, interpret, analyze and use the information efficiently to process the data and solve the problems using the information correctly (American Library Association, 1998; Farmer & Henri, 2008; Kong, 2014; Van Aalst, Fung, Li & Wong, 2007). IL also linked to an individual who knows to use computers and resources to access information to achieve the objects and critical reflection (Leung & Lee, 2012; Shaprio & Hughes, 1996). Moreover, the American Library Association (1998) believed that IL is a survival skill in this information age. It is the fundamental requirement for people to engage in this information society and become the basic human right for lifelong learning (Van Aalst et al., 2007). Besides, the American Library Association (1998) stated that IL helps people verify the authoritative hypothesis and become independent seekers of truth. Furthermore, Jones-Jang, Mortensen, and Liu (2019) claimed that IL also helps to clarify and develop the ability of living in the digital environments. People can locate information with self-efficiency and accuracy to identify fake news and navigate information online which is

verified and reliable. To assist with the development of information literacy in economic globalization, expanding the growth of knowledge should be provided to the society as the knowledge economy is proliferating, which requires processing information (Kong, 2007).

2.2 The impacts of Information literacy

IL brings positive impacts for society, especially for students. It claims that students should learn and immerse themselves in IL in their study. Kong (2014) stated that at the fundamental education stage, IL helps raise students' awareness of the significance and need of IL and the capacity in classroom learning. According to Farmer and Henri (2008), schools will be convinced of IL's values when bringing them to education. In students' learning, it enhances students' reading comprehension and learning and research process. It also brings them critical thinking skills and influences them to engage in lifelong learning.

From social perspectives, IL helps to empower and engage in citizenship (Walton & Cleland, 2017). With the skills and knowledge of IL, students can negotiate different issues through conversation and argument, such as the social construction, cultural authority of knowledge, political economies of knowledge and control and the development of local communities and cultures capacities. Without the skills and knowledge of IL, citizens are unaware of their social and political issues which may result in loss of opinion and discernment and cause

harm for the nations (Dudziak, 2007). Hence, this knowledge helps them to build up awareness of being a citizen and engaging in citizenship. Moreover, students with IL are developed the capacity to work independently and socially hence to benefit from the skills and contribute to the society and the global community (Kong, 2007).

Apart from that, students are being more dependent on the internet and spending much time on social networking sites. Some of them would make essential life decisions online and trust the information from the internet easily. With the skills and knowledge of IL, students will avoid internet risks such as being the target of harassment and privacy violation on social networking sites (Leung & Lee, 2012). Through assessing and evaluating information online, they should be able to make their decisions thoughtfully. Besides, Çoklar, Yaman & Yurdakul (2017) pointed out that IL is positively related to digital nativity and online information search strategies (OISS). Students can choose the main concepts regarding the search topic purposefully and get the most incredible effects. In addition, IL helps to identify fake news by navigating and locating information with efficiency and accuracy (Jones-Jang et al., 2019). Thus, IL shows great impacts in the internet world in the digital generation.

2.3 IL, tertiary education, and lifelong learning

Not only identify and evaluate information, but IL is also undoubtedly related to further study in tertiary education and lifelong learning. In the perspective of tertiary education, Ilett (2019) and Walton and Cleland (2017) indicated that in tertiary education, IL acts as an everyday practice and is commonly used in academic contexts. There are various opportunities for students to make conversation, discourse, argument, debate, and negotiation of meaning. Students also need to find useful and reliable resources when they are writing academic essays. However, Ball (2019) indicated that many students only had basic digital and information literacy skills when they entered the university, and they lack the critical thinking skills to assess and evaluate the materials they needed. It shows that IL is one of the essential skills in higher education.

As mentioned above, IL is positively related to lifelong learning and the ability of “learning to learn” throughout our lives. According to Farmer and Henri (2008), IL allows people to explore, evaluate, apply, and organize information effectively to reach their goals in personal, career and social aspects. Hence, they can develop proper information processing approaches to consider greater autonomy throughout their lives (Kong, 2008). Also, Dudziak (2007) pointed out that lifelong learning helps strengthen competencies for working and living in a learning society to foster social inclusion and socio-economic development. He stated that

some developing countries are confronting the challenges about the quality of education for improving higher social mobility. Cultivating the culture of lifelong learning helps to encourage a paradigmatic revolution in society. By enhancing IL in society, citizens can identify and analyze different content, enhance the abilities of creativity, problem-solving, critical thinking, and develop the ability for “learning to learn”. Thus, citizens with lifelong learning abilities can easily adapt to the future development trend to cope with the challenges (Feng & Ha, 2016).

2.4 Framework of IL

Numerous academic articles mentioned the frameworks, levels, and perspectives of IL, these interpretations are similar to describe the progress of learning IL. Such as Shapiro and Hughes (1996) suggested seven facts of IL, including tool, resource, social-structural, research, publishing, emergent, and critical literacy. It demonstrates how IL plays at each level. Moreover, Kong (2014) explained that there are four principal perspectives of IL. It involves cognitive aspects for inform decisions and problem-solving, meta-cognitive aspects for processing information reflectively, affective aspects for recognizing and enjoying the inquiry process, and socio-cultural aspects for demonstrating autonomy over social responsibility respectively.

Besides, Walton and Cleland (2017) proposed the five discrete levels of information discernment. It helps us identify the levels of people engaging in IL from evaluating the information in terms of quantity to the highest level to evaluate the references' links to support an argument. Under the frameworks, these are the scales for us to observe how people make fair use of IL in their lives.

Besides, Education Bureau (2018) published a guideline for teaching IL, which includes three main categories and eight literacy areas (refer to annex 1). The three main categories are effective and ethical use of information for lifelong learning, generic IL skills and information world—the literacy areas surrounded by the main categories in the more in-depth descriptions. Teachers can follow the guideline to design the curriculum of IL for different grades of students. However, this framework is adapted to be the main framework in this research.

2.5 Similar studies about IL

There are studies to explore the implementation of IL in different subjects in secondary schools, even colleges globally. Van Aalst et al. (2007) conducted a study to examine the IL of secondary six students through doing an inquiry project in Liberal Studies. The researchers

tested their skills and knowledge of the information searching process to study the significance of learning IL during the lessons.

Kong (2014) has also studied developing students' IL and critical thinking by flipped classrooms using trial teaching. Also, he used the pre-test and post-test to test students' growth in domain knowledge. Chang, Zhang, Mokhtar, Foo, Majid, Luyt & Theng (2012) compared the skills level of IL in two secondary schools in Singapore. The result proved that lower-order IL skills such as information seeking abilities were more adapted by students than the higher-order IL skills. They suggested that schools should put more effort into higher-order IL skills through different teaching strategies to evaluate and synthesize hence developing their IL at school.

Besides, in tertiary education, Lanning and Mallek (2017) have investigated what factors may influence students' knowledge of IL and their levels in IL. They found out that living areas including urban or rural, small or large high schools and family background also influenced their levels in IL. Also, high school students did not have the IL skills expected for college. It shows that how IL is essential in secondary education.

3. Research objectives and questions

3.1 Research objectives

This study aims to investigate the feasibility of integrating information literacy (IL) into the ICT lessons in junior forms. The study can be conducted by examining the students' current understandings on IL by the results of pre-test, examining the effectiveness of integrating IL into ICT lessons in junior forms by comparing the results of pre-test and post-test and examining students' awareness and opinions on IL in different perspectives.

3.2 Research questions

Based on the research objectives above, the following research questions are formulated:

1. What are students' current understandings on IL?
2. How effective is the integration of information literacy in the ICT lessons?
3. What are students' views on the importance of information literacy?

4. Research methods

4.1 Participants and context of the study

This study was conducted in a local secondary school which was my placement school during the block practice. The participants of this study were two classes of the secondary three students that I have taught during the block practice. The total numbers of the students were 27 students and there were 11 students from 3A and 16 students from 3B. The medium of instruction of the two classes was Chinese.

The design of the study was based on the IL guidelines from the Education Bureau (2018) on three main categories and eight IL areas (refer to appendix 1). The study was divided into five phases (Figure 1). The lessons of skills and knowledge of IL were delivered to students in the first 10 minutes of every ICT lesson for four weeks. All four sessions included the contents from the IL guidelines in eight IL areas (Table 1). In the first phase of the study, a pre-test was given to test students' current understandings of IL. Then, the second phase started to deliver the lessons integrating information literacy for four weeks. Several topics were selected for the lessons, such as searching skills, identifying the reliability of sources and intellectual property and copyright. In the last lesson of the integration, a pre-test was given to students to compare their changes in knowledge levels. Also, they needed to complete a survey on their awareness of IL and opinions on the design of the lesson. Moreover, the final

phase of the study is an interview to discuss students' deeper perspectives and application on

IL.



Figure 1. The flowchart of the research procedure and implementation

Table 1: The lessons content of the integration

Lesson	Date	Relevant IL Area	Content
1	3A: 3 Nov 2020 3B: 30 Oct 2020	1	<ul style="list-style-type: none"> ● Pre-test ● Introducing of IL
2	3A: 10 Nov 2020 3B: 13 Nov 2020	2, 3, 6	<ul style="list-style-type: none"> ● Searching skills (using searching operators) ● Comparing the results of using different skills
3	3A: 17 Nov 2020 3B: 20 Nov 2020	4, 5, 7, 8	<ul style="list-style-type: none"> ● Identifying the sources of information by the reliability, accuracy ● Introducing Examples of reliable sources of information
4	3A: 24 Nov 2020 3B: 27 Nov 2020	1, 7, 8	<ul style="list-style-type: none"> ● Introducing Domains of the websites ● Introducing Intellectual property and Copyright ● Post-test and survey

4.2 Data collection

The data was collected from October 2020 to March 2021. Both qualitative and quantitative research methods were endorsed in this study. For the qualitative research method, interview and class observation were adopted. For the quantitative research method, pre-test, post-test and survey were adopted.

4.2.1 Pre-test

All students needed to complete a pre-test (appendix 1) at the beginning of the study, which was the first lessons of integrating IL into the ICT lesson (table 1). The pre-test paper included twelve multiple-choice questions based on the eight IL areas from the Education Bureau (2018). It aimed to test students' current understanding of IL and their weakness IL areas for comparing the results afterwards. The questions involved searching skills, the methods to identify reliable sources and intellectual property and copyright etc.

4.2.2 Class observation

In the last lessons of integrating IL, there was a class observation for each class. It aimed to observe students' performance during the class, such as their reactions and attitude towards the topics and the ability of giving examples. A class observation form was created to help to evaluate how students engaged in the classes.

4.2.3 Post-test

In the last lessons of the integration, students needed to complete a post-test (refer to appendix 2) with a similar question structure with the pre-test. It also included the questions with eight IL areas (Education Bureau, 2018). After receiving the post-test papers, the results can be compared with the pre-test to examine how much improvement did the students make in these four lessons. Thus, the comparison can prove how effective the integration in ICT lessons.

4.2.4 Survey

Following the post-test, students needed to complete a survey about IL's perspectives on the integration. Through the survey, it can be evaluated how students' opinions on the importance of IL and how they can apply IL in their daily life, study, and future career. Also, the design of the integration lessons can be evaluated through how students claimed that they raised their awareness of IL.

4.2.5 interview

The interview was conducted in March 2021, and three students were invited to engage in the interview. The questions of interview were mainly based on the results of the survey (refer to appendix 4). There were seven questions in the interview to focus on the importance of each

IL skill and the application in their daily life. Moreover, questions on using IL in their future career were asked to evaluate how they were willing to make use of IL.

4.3 Data analysis

Since the study adopted mixed research methods, the collected data were used to analyze the results of each research question (Table 2).

Table 2: Summary of the data collection and the research methods adopted

Research question	Research method	Data source	Analysis method
1. What are students' current understandings on IL?	Quantitative	Pre-test and post-test	● Analyze the marks of the paired questions and the IL areas
2. How effective is the integration of information literacy in ICT lessons?	Quantitative	Pre-test and post-test, survey	● Compare the marks of pre-test and post-test. ● Compare the scales of the awareness.
	Qualitative	Interview, class observation	● Content analysis
3. What are students' views on the importance of information literacy?	Quantitative	Survey	● Analyze the mean score and percentage of the survey results.
	Qualitative	Interview	● Content analysis

For the first research question, I mainly used the quantitative research method to evaluate students' current understanding of IL. The pre-test and post-test results were used to analyze

the marks of the paired questions with similar question structure and IL areas by the mean scores.

For the second research question, both quantitative and qualitative research methods were used to evaluate the effectiveness of integration in the ICT lessons. In the quantitative research method, the pre-test and post-test results were used to compare the paired questions with the same question structures and the comparison of the questions ordered by IL areas for the analysis of the improvement using paired t-test. The survey was used to analyze how students' awareness has improved before and after the integration by the mean scores and the p-value using paired t-test. In the qualitative research method, interview and class observation were used to analyze their opinions on the integration's effectiveness.

For the third research question, both quantitative and qualitative research methods were used to evaluate students' opinions on the importance of IL. In the quantitative research method, the survey was used to analyze the mean score, p-value and percentage of the results to examine students' tendency on the importance and application of IL in different perspectives (daily life, social, study and future career) using the mean score. With the qualitative research method, the interview was used to complement the survey results to analyze students' more profound opinions on the importance of IL in the perspectives.

5. Results and discussion

The data collection mentioned provided evidence for revealing the effectiveness of IL's integration into ICT lessons in the junior secondary curriculum. The results would be divided into three parts to respond to the research questions from the previous parts. They are (1) students' current understandings of IL, (2) the effectiveness of the integration of IL in the ICT lessons and (3) students' views on the importance of IL.

5.1 Students' current understandings on IL

The overview of the pre-test and post-test results shows that students' current understandings of IL were not efficient to manipulate IL skills and knowledge. From Table 3, the mean score of the pre-test from 3A and 3B students were 4.27 and 5.75 respectively which were not higher than half of the total marks of the test (6 marks). It claims that before the integration, students did not have well understandings of IL.

Table 3: *The overview of the results of pre-test and post-test Marks*

		<i>N</i>	<i>Maximum</i>	<i>Minimum</i>	<i>Mean</i>	<i>SD</i>
<i>Pre-test</i>	<i>3A</i>	<i>11</i>	<i>8</i>	<i>2</i>	<i>4.27</i>	<i>1.902</i>
	<i>3B</i>	<i>16</i>	<i>8</i>	<i>2</i>	<i>5.75</i>	<i>1.653</i>
	<i>Total</i>	<i>27</i>	<i>8</i>	<i>2</i>	<i>5.15</i>	<i>1.875</i>
<i>Post-test</i>	<i>3A</i>	<i>11</i>	<i>8</i>	<i>2</i>	<i>4.27</i>	<i>2.149</i>
	<i>3B</i>	<i>16</i>	<i>11</i>	<i>4</i>	<i>7.56</i>	<i>2.065</i>
	<i>Total</i>	<i>27</i>	<i>11</i>	<i>2</i>	<i>6.22</i>	<i>2.636</i>

Moreover, the statistics of each paired question in the pre-test and post-test (Table 4)

indicated students' performance of their weakness IL areas and question types in the pre-test.

Indeed, Q.4, Q.10 and Q.12 got the lowest mean score in the pre-test which were 0.11 and

0.26. It involves the IL area 3, 6 and 7 and the questions about searching strategies of using

operators, identifying the sources and the domains of websites (refer to appendix 2). It claims

that students were weak at searching skills and identifying the sources.

Table 4: The statistics of each paired questions in pre-test and post-test

The statistics of each paired questions in pre-test and post-test						
		IL Area	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Post-test Q.12	3	0.52	27	0.509	0.098
	Pre-test Q.2		0.52	27	0.509	0.098
Pair 2	Post-test Q.6	3	0.52	27	0.509	0.098
	Pre-test Q.3		0.52	27	0.509	0.098
Pair 3	Post-test Q.4	3	0.44	27	0.506	0.097
	Pre-test Q.4		0.11	27	0.320	0.062
Pair 4	Post-test Q.2	4	0.85	27	0.362	0.070
	Pre-test Q.6		0.37	27	0.492	0.095
Pair 5	Post-test Q.9	1	0.70	27	0.465	0.090
	Pre-test Q.7		0.70	27	0.465	0.090
Pair 6	Post-test Q.3	5	0.15	27	0.362	0.070
	Pre-test Q.8		0.30	27	0.465	0.090
Pair 7	Post-test Q.10	7	0.56	27	0.506	0.097
	Pre-test Q.10		0.26	27	0.447	0.086
Pair 8	Post-test Q.5	8	0.26	27	0.447	0.086
	Pre-test Q.11		0.41	27	0.501	0.096
Pair 9	Post-test Q.8	6	0.56	27	0.506	0.097
	Pre-test Q.12		0.26	27	0.447	0.086

Remark: All the questions in the pre-test and post-test are classified into eight information literacy areas (Education Bureau, 2018).

Referring to the pre-test and post-test statistics by IL areas (Table 5), all questions were divided into eight IL areas and it shows students' performance in each of the IL area in the pre-test. Comparing the mean scores, students were weak at IL area 5, 6 and 7 notably area 6 and 7 got the lowest score which was 0.2593.

Table 5: The statistics of the pre-test and post-test by information literacy areas

The statistics of the pre-test and post-test by information literacy areas						
			Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Area 1: Use, provide and communicate information ethically and responsibly	Post-test	0.7037	27	0.46532	0.08955
		Pre-test	0.5000	27	0.27735	0.05338
Pair 2	Area 2: Identify and define a need for information	Post-test	0.5185	27	0.50918	0.09799
		Pre-test	0.6296	27	0.49210	0.09471
Pair 3	Area 3: Locate and access relevant information	Post-test	0.4938	27	0.28300	0.05446
		Pre-test	0.3827	27	0.27275	0.05249
Pair 4	Area 4: Evaluate information and information providers	Post-test	0.8519	27	0.36201	0.06967
		Pre-test	0.5741	27	0.33119	0.06374
Pair 5	Area 5: Extract and organise information and create new	Post-test	0.1481	27	0.36201	0.06967
		Pre-test	0.2963	27	0.46532	0.08955
Pair 6	Area 6: Be able to apply IT skills	Post-test	0.5556	27	0.50637	0.09745
		Pre-test	0.2593	27	0.44658	0.08594
Pair 7	Area 7: Recognise the roles and functions of information providers	Post-test	0.5370	27	0.43690	0.08408
		Pre-test	0.2593	27	0.44658	0.08594
Pair 8	Area 8: Recognise the conditions under which reliable information could be obtained	Post-test	0.4444	27	0.37553	0.07227
		Pre-test	0.4074	27	0.50071	0.09636

Remark: All the questions in the pre-test and post-test are classified into eight information literacy areas (Education Bureau, 2018).

Questions included in each IL area:

- | | | |
|-------------------------------------|--------------------------------------|--|
| 1: Pre-test: Q.1,7; Post-test: Q.9 | 2: Pre-test: Q.9; Post-test: Q.7 | 3: Pre-test: Q. 2,3,4; Post-test: Q.4,6,12 |
| 4: Pre-test: Q.5,6; Post-test: Q.2 | 5: Pre-test: Q.8; Post-test: Q.3 | 6: Pre-test: Q.12; Post-test: Q.8 |
| 7: Pre-test: Q.10; Post-test: Q1,10 | 8: Pre-test: Q.11; Post-test: Q.5,11 | |

From the class observation in the last lessons of the integration (Table 6, refer to appendix 6), there were some students' responses in their misunderstandings and their experience in

different topics. Regarding the reliability of the internet sources, both 3A and 3B students had misunderstandings that Wikipedia is a reliable source and always used it in their schoolwork.

Ball (2019) indicated that it was expected that university students using Google and Wikipedia as their sources rather than using the digital resources from the university library.

It shows that it is a common misunderstanding all over the world. Besides, students responded that they did not seem aware of intellectual property and copyright and did not know about the meanings of website domains. Like the results from Chang et al. (2012), students also lacked knowledge in information ethics, including copyrights and plagiarism.

Table 6: Summary of students' performance from class observation

Topics	3A	3B
The reliability of the internet sources (IL Area 3)	<ul style="list-style-type: none"> ● Used Wikipedia all the time including school homework or individual use. ● Always got information through social media. 	<ul style="list-style-type: none"> ● Had misunderstandings which Wikipedia is a reliable source with accurate information.
Intellectual property and copyrights (IL Area 1)	<ul style="list-style-type: none"> ● Did not care about the intellectual property and copyrights. 	<ul style="list-style-type: none"> ● Responded that they did not care about the it and they have just copied all the paragraphs they needed and pasted to the homework.
Website domains (IL area 7)	<ul style="list-style-type: none"> ● Did not know the meaning of each domain. ● Did not know what the meaning of "organization" is. 	<ul style="list-style-type: none"> ● Can give some domains ● Did not clearly know what are the meanings that the domains represent (e.g. "org" and "com")

Combining two overviews results from the pre-test and class observation, students were weak at IL area 6 (Be able to apply IT skills) and 7 (Recognise the roles and functions of information providers) commonly. Besides, students were also weak at IL area 1 (Use, provide and communicate information ethically and responsibly), 3 (Locate and access relevant information) and 5 (Extract and organise information and create new ideas). The results show that students did not have well background understandings of IL, especially in the searching skills and identifying reliable sources. However, they may not have the ability to manipulate IL skills in the different application before the integration started.

5.2 Effectiveness of integrating IL into ICT lessons

Based on the analysis of the pre-test and post-test results and the survey, the effectiveness of integrating IL into ICT lessons can be evaluated to verify the feasibility of the integration. In comparing the paired questions in the pre-test and post-test (Table 7), nine questions were paired with the same IL areas and question types. Within the pairs, it shows students' significant improvement in two tests. In pair 3, 4, 7 and 9, there was a significant improvement in the results in which the p-values were lower than 0.05 and the relevant areas were area 3, 4, 6 and 7. The improved question types included searching strategies of using searching operators, intellectual property and the reliability of a source and the domains of websites. Moreover, the improved IL area was area 3, 4, 6 and 7. Besides, the difference

between the remaining five questions is not statistically significant and did not show significant improvement.

Table 7: The comparison of the paired questions in the pre-test and post-test

The comparison of the paired questions in the pre-test and post-test										
		IL Area	Paired Differences				t	df	Sig. (2-tailed)	
			Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
						Lower				Upper
Pair 1	Post-test Q.12 - Pre-test Q.2	3	0.000	0.620	0.119	-0.245	0.245	0.000	26	1.000
Pair 2	Post-test Q.6 - Pre-test Q.3	3	0.000	0.734	0.141	-0.290	0.290	0.000	26	1.000
Pair 3	Post-test Q.4 - Pre-test Q.4	3	0.333	0.555	0.107	0.114	0.553	3.122	26	0.004
Pair 4	Post-test Q.2 - Pre-test Q.6	4	0.481	0.643	0.124	0.227	0.736	3.893	26	0.001
Pair 5	Post-test Q.9 - Pre-test Q.7	1	0.000	0.480	0.092	-0.190	0.190	0.000	26	1.000
Pair 6	Post-test Q.3 - Pre-test Q.8	5	-0.148	0.602	0.116	-0.386	0.090	-1.280	26	0.212
Pair 7	Post-test Q.10 - Pre-test Q.10	7	0.296	0.669	0.129	0.032	0.561	2.302	26	0.030
Pair 8	Post-test Q.5 - Pre-test Q.11	8	-0.148	0.718	0.138	-0.432	0.136	-1.072	26	0.294
Pair 9	Post-test Q.8 - Pre-test Q.12	6	0.296	0.669	0.129	0.032	0.561	2.302	26	0.030

Remarks: The paired questions are based on the questions with the same information literacy areas and question structures. Three questions from pre-test and post-test are excluded.

Comparing the pre-test and post-test questions by IL areas, all the questions were classified into eight IL area below (table 8). Within eight IL areas, six areas show the improvement with the increase in the mean score (area 1, 3, 4, 6, 7 & 8). Indeed, four of the areas got significant improvement which their p-values were lower than 0.05. The areas were area 1, 4, 6 and 7. However, the remaining two areas got lower mean scores than the pre-test and it shows that students may not improve in areas 2 and 5.

Table 8: The comparison of the results in the pre-test and post-test by information literacy area

The comparison of the results in the pre-test and post-test by information literacy areas									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Area 1: Use, provide and communicate information ethically and responsibly	0.20370	0.46532	0.08955	0.01963	0.38778	2.275	26	0.031
Pair 2	Area 2: Identify and define a need for information	-0.11111	0.50637	0.09745	-0.31142	0.08920	-1.140	26	0.265
Pair 3	Area 3: Locate and access relevant information	0.11111	0.34592	0.06657	-0.02573	0.24795	1.669	26	0.107
Pair 4	Area 4: Evaluate information and information providers	0.27778	0.50637	0.09745	0.07746	0.47809	2.850	26	0.008
Pair 5	Area 5: Extract and organise information and create new ideas	-0.14815	0.60152	0.11576	-0.38610	0.08980	-1.280	26	0.212
Pair 6	Area 6: Be able to apply IT skills	0.29630	0.66880	0.12871	0.03173	0.56086	2.302	26	0.030
Pair 7	Area 7: Recognise the roles and functions of information providers	0.27778	0.57735	0.11111	0.04939	0.50617	2.500	26	0.019
Pair 8	Area 8: Recognise the conditions under which reliable information could be obtained	0.03704	0.64935	0.12497	-0.21984	0.29391	0.296	26	0.769

Remarks: All the questions in the pre-test and post-test are classified into eight information literacy areas (Education Bureau, 2018).

Questions included in each IL area:

- 1: Pre-test: Q.1,7; Post-test: Q.9 2: Pre-test: Q.9; Post-test: Q.7 3: Pre-test: Q. 2,3,4; Post-test: Q.4,6,12
4: Pre-test: Q.5,6; Post-test: Q.2 5: Pre-test: Q.8; Post-test: Q.3 6: Pre-test: Q.12; Post-test: Q.8
7: Pre-test: Q.10; Post-test: Q1,10 8: Pre-test: Q.11; Post-test: Q.5,11

Apart from the pre-test and post-test results, data collected from the survey can show how students changed their awareness of IL before and after the research. The comparison below (table 9) shows that the p-values of all five items of students' awareness were smaller than 0.05 and students' awareness of IL got significant enhancement after the integration of IL into ICT lessons. However, students got the most significant awareness changes in the searching skills and indicated the accuracy and reliability of a source whose difference in the mean scores was 1. Besides, the mean scores of all items were higher than 0.8, and it claims that students ranked their awareness of IL one grade higher than before. Therefore, it claims that

most of the students agreed that they had enhanced their awareness of IL after integrating the IL.

Table 9: *The comparison of the awareness of information literacy before and after the research*

The comparison of the awareness of information literacy before and after the research								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Searching skills	1.000	0.832	0.160	0.671	1.329	6.245	26	0.000
Indicate the accuracy and the reliability of a source	1.000	0.784	0.151	0.690	1.310	6.624	26	0.000
Distinguish the correct information and avoid receiving fake information	0.852	0.718	0.138	0.568	1.136	6.164	26	0.000
Understanding on plagiarism and avoid plagiarism	0.815	0.736	0.142	0.524	1.106	5.755	26	0.000
Understanding on Copyright and Intellectual Property	0.852	0.818	0.157	0.528	1.176	5.410	26	0.000

Remarks: The items of awareness are based on the generic information literacy skills (Education Bureau, 2018).

To summarize the effectiveness of the integration of IL into ICT lessons, refer to chapter 6.1, it indicates that students were mainly weak at IL area 6 and 7 and they did not have well understandings on area 1, 3 and 5. From the above analysis, after the integration of IL into ICT lessons, students got significant improvement in area 3, 4, 6 and 7 compared with the paired questions. They got significant improvement in area 1, 4, 6 and 7. It shows that students have enhanced their knowledge of IL in their weakness areas and question types. Overall, almost half of the paired questions and three-quarters of IL areas were improved after the integration. Apart from the IL areas, students also gained more searching skills and indicated the accuracy and reliability of a source. Providing students with authentic learning

opportunities including the real-life application, they are encouraged to apply the skills in different contexts (Kong, 2007). Hence, by combining the above analysis, students improved their weakness IL area and enhanced the knowledge and skills IL after the integration. Implementing IL in the local school curriculum can help students gain the relevant knowledge and attitudes for their whole personal development in this information society (Kong, 2007). Moreover, as students can develop IL competency in the classroom setting, they can enhance information process tasks such as decision making, outcome evaluation and strategy modification (Kong, 2014). Thus, it shows that it is effective to integrate IL into ICT lessons in junior secondary grades.

5.3 Students' views on the importance of IL

Apart from students' improvement in the pre-test and post-test, students' views are also critical to evaluating the effectiveness of integration and students' attitude in learning the knowledge. Referring to Table 10, it shows how students scaled their perspectives on the importance of IL in modern life in the survey. The mean score of the scales was 4.07, and it was near the total score, which is 5. It shows that most of the students agreed that IL is vital in modern life, especially in today for living in this learning society (Leung & Lee, 2012; Dudziak, 2007).

Table 10: *The scales of students' perspectives on the importance of information literacy in modern life*

The scales of students' perspectives on the importance of information literacy				
	N	Mean	Std. Deviation	Std. Error Mean
Result	27	4.07	0.730	0.140

Looking at how students thought about the importance of IL, Table 11 shows which of the skills they thought is the essential skills of IL. The mean score of indicating the accuracy and the reliability of a source is the lowest among the items which are 2.19. It means that students claimed that it is the most essential skills in the IL. Nevertheless, the mean score of avoiding violating copyright and intellectual property rights got the highest mean score which is 3.41. It means that students claimed that it is the least essential skills in the IL.

Table 11: *Students' perspectives on the importance of information literacy*

Students' perspectives on the importance of information literacy				
	N	Mean	Std. Deviation	Variance
Searching Skills	27	3.15	1.854	3.439
Indicating the accuracy and the reliability of a source	27	2.19	1.039	1.080
Distinguishing the correct information	27	3.04	0.854	0.729
Avoiding plagiarism	27	3.22	1.155	1.333
Avoiding violating copyright and intellectual property rights	27	3.41	1.693	2.866
Valid N (listwise)	27			

Remark: The items are based on the generic information literacy skills (Education Bureau, 2018).

Scale from one to five, one is the most important and five is the least important.

From the interview (refer to appendix 7), students responded with their opinions of indicating the accuracy and the reliability of a source. They thought they should identify the sources from the internet by “fact check” (distinguish the accuracy of information) and avoid receiving fake information. Besides, one of the students talked about the content farm and people should be careful to access those types of websites.

“Because there is much fake news on the internet and many people talk about “fact check”. Although we check some information on the internet, it could be fake.” (Student A)

“In our daily life, we could see “content farm” in social media. There is much fake information, and it is spread by many people. The information sources may not be reliable and accurate.” (Student B)

In the Intellectual Property and copyright, students responded that they did not know much before the integration. However, they knew that it is highly related to our daily lives and found that they violated it before. They agreed that they should respect the authors.

“I don’t know much about Intellectual Property before. After the lessons, I found that it is positively related to our daily life. We should state the sources and the authors.” (Student A)

“I always watch videos from YouTube. I knew that I may violate the IP every day. I think that it is important and we should respect to the authors. IP also can protect the rights of authors.” (Student C)

In the searching skills, students thought that it is the basic step of searching information and it provides us to filter out the useless information.

“I think that searching skill is more important. Because we need to know “how to search”. If they grasp the skills, they can filter from the searching results and get useful information. This is the basic step of searching information.” (Student C)

Furthermore, in students’ perspectives on the application of information literacy in daily life (Table 12), it shows how their frequent application of IL in their daily life. Doing assignment got the lowest mean scores and it means that they agreed that they apply IL mostly in doing the assignment. Besides, seeking hot topics got the highest mean scores and it means that they used IL for seeking hot topics rarely.

Table 12: *Students’ perspectives on the application of information literacy in daily life*

Students' perspectives on the application of information literacy in daily life				
	N	Mean	Std. Deviation	Variance
Searching news on the internet	27	2.81	1.388	1.926
Doing assignments	27	2.30	1.171	1.370
Receiving information from the social media	27	3.15	1.134	1.285
Seeking for hot topics	27	3.78	1.450	2.103
Learning new knowledge	27	2.67	1.544	2.385
Valid N (listwise)	27			

Remark: The items are the application in real-life situations. Scale from one to five, one is the most important and five is the least important.

From the interview, some students also shared that they could use IL to ensure the accuracy of the information when doing homework and some students shared that they use IL to access social media. Students can use IL to avoid internet risks and receiving misleading information from the social media. IL is highly related to fake news literacy which improves citizens ability to differentiate fake from the information on the internet or real news in this digital society (Jones-Jang et al., 2019).

“After I have learnt IL, I can identify the accuracy of the information. So, I can avoid using the wrong information in my homework.” (Student A)

“We access social media like Facebook and online forum, we could use the skills a lot. But I can apply it a lot when I am doing assignments.” (Student B)

Apart from indicating students’ application in daily life, students also responded to using IL in their daily lives (Figure 2). Almost most of the students (96.3%) responded that they would use IL in their daily life.

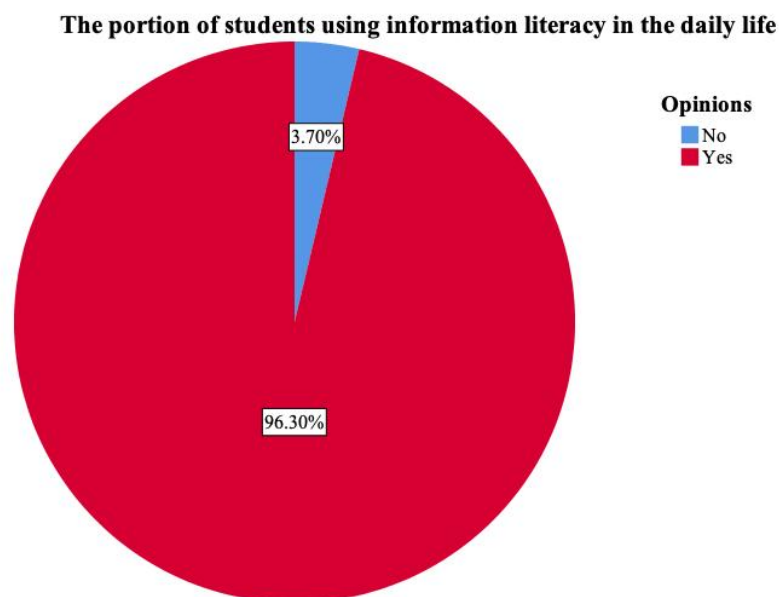


Figure 2. *The portion of students using information literacy in the daily life*

In students' views on the use of IL in the future career (Figure 3), almost three-quarters (74.07%) of students would use it in their future career. According to Walton and Cleland (2017), IL can benefit individuals and society in study and the workplace.

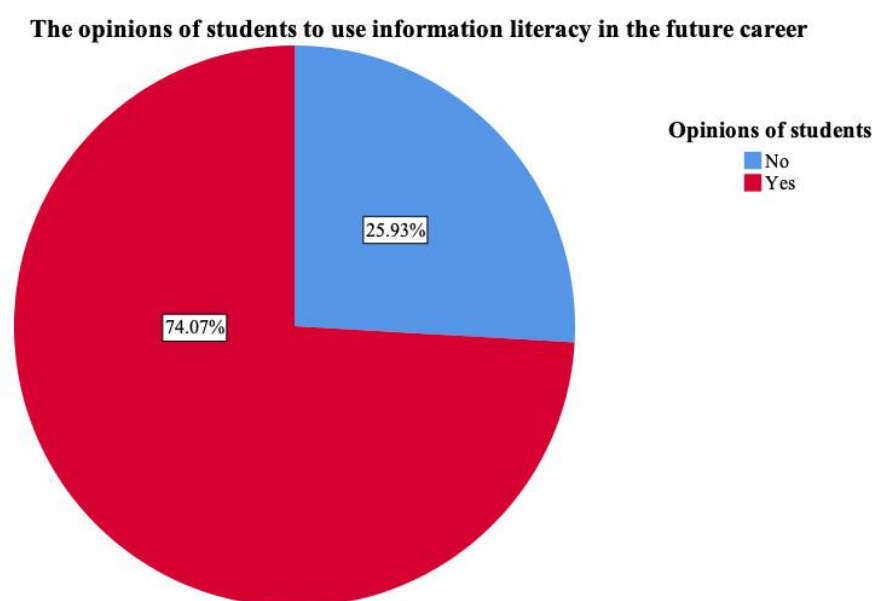


Figure 3. *The opinions of students to use information literacy in the future career*

From students' sharing from the interview (refer to appendix 7), students thought that they could use IL in the future career, especially in choosing the electives subjects in senior grades, doing the assignment in tertiary education and the workplace. They could verify the information from different sources to choose the most reliable and accurate information.

“We are going to choose electives subjects in senior grades. There are many websites for us to read. But the most reliable is the government website or some fake news website. We should be careful to search for the information we need.” (Student A)

“We will search for information from the internet for our study. You also will use the skills in further studies.” (Student B)

“We may be cheated by the companies and we should be careful. For example, we should check their official websites and the comments from different people.” (Student C)

To summarise how students responded to the importance of IL in daily life, study and future career, the analysis above shows that most of the students agreed that IL is vital in the perspectives. Indeed, students claimed that identifying reliable and accurate sources is the most critical skills to avoid receiving fake and misleading information. Moreover, students believed that searching skills are the primary step in the searching process. However, students showed their unawareness of intellectual property and copyright.

Students thought that they could use IL in the study most as Farmer and Henri (2008) explained that students could internalise the skills better when IL is integrated into an academic context. Besides, in the future career, students can use the IL skills in higher education which can be more successful than the students without instructions of IL during secondary education (Farmer & Henri, 2008). Apart from that, IL helps students develop lifelong learning and critical thinking, which helps them assume greater autonomy in society with responsibility and inclusion (Kong, 2007; Farmer & Henri, 2008). Moreover, information literate person can avoid the internet risks such as privacy violation and harassment when they access social media sites (Leung & Lee, 2012). Students can process the skills by evaluating and interpreting the information to make life decisions. Therefore, in the curriculum, those skills are required to be taught for secondary students.

6. Limitations

The sample size of this study is not extensive enough to observe the changes in a board perspective due to the classes taught during the block practice. Indeed, only 27 participants were involved in this study and it was not enough to evaluate the effectiveness on a bigger scale. Besides, only one grade of students was involved in this study and the study did not evaluate the effectiveness of the integration in different grades in junior secondary grades.

Besides, the study only conducted in four weeks due to the time limit during the block practice. Only limited topics on IL can be delivered to students and the effectiveness of all IL areas was not noticeable. Moreover, the time limitation with the original curriculum (App inventor), the integration only can be conducted in the beginning 10 minutes of every lesson. It was not fully integrated during the research.

7. Conclusion

In conclusion, this study investigated the effectiveness of integrating information literacy skills and knowledge in junior secondary ICT lessons for students gaining the IL skills to apply in this information generation to encounter the situations. Throughout the study, it can be found that students have improved their weakness IL areas and questions after the integration of IL in the ICT lessons especially in the IT skills and recognize the information providers. Besides, in terms of students' views on the importance of IL, students agreed that IL is vital in their daily life, study and future career especially using the skills of identifying reliable and accurate information and the searching skills. Moreover, knowledge on intellectual property and copyright should contribute more time to raise their awareness.

7.1 Response to the RQs

Here are the responses to the research questions:

For the RQ1:

Responding to students' current understandings of IL before the integration, the results show that students did not understand IL and could not have the ability to manipulate the application of IL before the integration. From the pre-test results, most of the students did not get half of the total marks. Analyzing students' weakness IL areas in the pre-test and class observation, students were primarily weak at IL area 6 and 7. Parts of them were also weak at IL area 1, 3 and 5. It also shows students weakness, especially in searching skills and identifying reliable sources. The analysis claims that the integration of IL is required to improve their weak areas in IL.

For the RQ2:

Responding to the effectiveness of integrating skills and knowledge of IL into ICT lessons, students have improved their weakness areas in the pre-test. They could get significant improvement in some areas after the integration of IL into ICT lessons. In brief, students got significant improvement in IL area 1, 3, 4, 6 and 7 comparing with the paired questions and the IL areas. Also, almost half of the paired questions and three-quarters of IL areas were an improvement. Students have enhanced their weakness IL areas after the integration. Besides,

in the skills and knowledge of IL, students got improvement and more awareness on searching skills and indicating the accuracy and reliability of a source. From the students' improvement, it is effective to integrate skills and knowledge of IL into ICT lessons.

For the RQ3:

Responding to how students' opinions on the importance of IL, the survey and the interview show how students think about IL in their daily life, social, study and future career. The analysis shows that most of the students agreed on the importance of IL, especially some students who thought that identifying reliable, accurate sources is the most critical skills.

Also, some students pointed out that searching skills are the first step of the searching process. In contrast, students did not seem aware of intellectual property and copyright. In the application of IL, students explained that they could use IL for schoolwork mostly. Some students pointed that that IL helps them identify information sources on social media sites. In future careers, IL also helps them collect and analyze useful information when choosing subjects and schools. Also, it helps their study in higher education. In brief, students agreed that IL is important in their lives.

By this study, the skills and knowledge of information literacy are effective to be integrated into ICT lessons in junior secondary grades to enhance students' abilities in different situations.

8. Implication

This study reflects the effectiveness of the integration of IL in junior secondary ICT lessons.

It is suggested that the skills and knowledge of IL with all IL areas can be integrated into all junior secondary grades (S1 to S3) with a broader perspective. Moreover, the integration should be held for the whole term. More real-life applications for students are needed to develop their capacity to become information literate.

Word count: 7080 words

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Appendix 1: Table of Literacy area description

The table below is from the guidelines of information literacy from the Education Bureau (2018):

Category	Literacy Areas	
Effective and Ethical use of information for lifelong learning	1	Use, provide and communicate information ethically and responsibly
Generic IL Skills	2	Identify and define a need for information
	3	Locate and access relevant information
	4	Evaluate information and information providers, in terms of authority, credibility and current purpose
	5	Extract and organise information and create new ideas
Information World	6	Be able to apply IT skills in order to process information and produce user-generated content
	7	Recognise the roles and functions of information providers (e.g. libraries, museums, internet) in the society
	8	Recognise the conditions under which reliable information could be obtained

Appendix 2: Pre-test paper

資訊素養研究：前測

姓名：_____

班別：_____ ()

<p>1. 當我們使用關鍵字/標題來搜尋一些目錄時大致上也會出現一樣的結果</p> <p>A. 是</p> <p>B. 否</p> <p>(Literacy Areas: 3)</p>	<p>2. 以下哪一個搜尋會出現比較少的結果？</p> <p>A. 青少年 AND 情緒病</p> <p>B. 青少年 OR 情緒病</p> <p>(Literacy Areas: 3)</p>
<p>3. 哪一個布林運算符可以供我們利用同義詞進行搜尋？</p> <p>A. AND</p> <p>B. OR</p> <p>C. NOT</p> <p>(Literacy Areas: 3, 7)</p>	<p>4. 假如你使用一個被截斷的字詞 motiv* 進來搜尋，以下那一個字詞會出現在你的結果中？請選出所有會出現的字詞。</p> <p>A. Motivate</p> <p>B. Option2</p> <p>C. Motive</p> <p>D. Motivator</p> <p>(Literacy Areas: 3)</p>
<p>5. Google 是_____？</p> <p>A. 一個網上目錄</p> <p>B. 一本書</p> <p>C. 一個研究資料庫</p> <p>D. 一個網絡搜尋引擎</p> <p>(Literacy Areas: 4,7,8)</p>	<p>6. 以下哪一個作品不被版權條例的保護？</p> <p>A. 聲音紀錄</p> <p>B. 原創的戲劇作品</p> <p>C. 改編音樂</p> <p>D. 廣播節目</p> <p>(Literacy Areas: 1,4)</p>
<p>7. 在你判斷資訊時，你應該考慮什麼因素？</p> <p>A. 作者的聲譽</p> <p>B. 資料的長度</p> <p>C. 資料的準確度</p> <p>D. 資料的及時性</p> <p>(Literacy Areas: 1,5,7,8)</p>	<p>8. 以下哪一個是最適合用作搜尋農曆新年和傳統食物的關鍵字？</p> <p>A. 農曆新年 AND 傳統食物</p> <p>B. 農曆新年 OR 傳統食物</p> <p>C. 農曆新年*</p> <p>D. “農曆新年 傳統食物”</p> <p>(Literacy Areas: 3,6)</p>
<p>9. 當你需要用到一些資料來完成專題研習時，你最需要考慮的問題是：</p> <p>A. 這是一個有良好設計的網頁嗎？</p> <p>B. 我可以在這個網頁購買商品嗎？</p> <p>C. 誰是這段資料的作者？這段資料準確嗎？</p> <p>(Literacy Areas: 1,2,3,4,7,8)</p>	<p>10. 以下哪一個資料來源會詳細描述一件事情的經過？</p> <p>A. 書</p> <p>B. 學術論文</p> <p>C. 報章</p> <p>D. 百科全書</p> <p>(Literacy Areas: 2,4,7,8)</p>
<p>11. 以下那一個網頁的頂級域最為可靠？</p> <p>A. .gov</p> <p>B. .com</p> <p>C. .org</p> <p>D. .net</p> <p>(Literacy Areas: 6,7,8)</p>	<p>12. 頂級域 .com 代表什麼？</p> <p>A. Community</p> <p>B. Communism</p> <p>C. Communion</p> <p>D. Commercial</p> <p>(Literacy Areas: 6)</p>

Appendix 3: Post-test paper

資訊素養研究: 後測

姓名: _____ 班別: _____ ()

<p>1. 你在進行一份關於綠色生活的專題報告，你需要搜尋有關家居廢物的數據，以下哪一個是最佳的資料來源？</p> <p>A. 維基百科 B. 網上論壇 C. 政府網頁 D. 新聞網頁 (Literacy Areas: 2,4,5,7,8)</p>	<p>2. 我們要如何保護知識產權？</p> <p>A. 轉發盜版音樂檔案 B. 購買正版音樂 C. 複製音樂到光碟上 D. 售賣複製音樂的光碟 (Literacy Areas: 1,4)</p>
<p>3. 假如你想搜尋有關 2019 年的網絡罪案，你可以怎樣做？ (Literacy Areas: 3,5)</p> <p>A. 搜尋「2019 年的網絡罪案」 B. 搜尋「網絡罪案 AND 2019」 C. 在新聞欄中搜尋「網絡罪案」並將日期範圍設定在 2019 D. 在新聞欄中搜尋「網絡罪案 AND 2019」</p>	<p>4. 當我們搜尋 Transport*, 以下哪個結果並不會出現？</p> <p>A. Transparent B. Transportation C. Transport system D. Transport policy (Literacy Areas: 3,5)</p>
<p>5. 當我們需要尋找一個非政府組織的工作報告，以下哪一個頂級域的資訊來源最可靠？</p> <p>A. .gov B. .com C. .org D. .net (Literacy Areas: 6)</p>	<p>6. 以下哪一個邏輯運算符讓我們可以在搜尋結果中排除某些關鍵字？</p> <p>A. AND B. OR C. NOT D. IN (Literacy Areas: 3,6)</p>
<p>7. 請以 1-4 排列以下資訊來源的可靠程度。(1 最可靠，4 最不可靠)</p> <p>維基百科 _____ 網上論壇 _____ 新聞網站 _____ 政府網站 _____ (Literacy Areas: 2,4,7,8)</p>	<p>8. .org 代表什麼？</p> <p>A. Organise B. Organisation C. Organic D. Organism (Literacy Areas: 6)</p>
<p>9. 當你需要在一個新聞網站搜尋資訊來完成功課時，你需要考慮的問題是：</p> <p>A. 新聞的寫作技巧 B. 新聞的用字 C. 新聞的準確度 (Literacy Areas: 1,2,3,4,5,7,8)</p>	<p>10. 以下哪一個是最佳的資訊來源來搜尋教育的歷史？</p> <p>A. 維基百科 B. 電影 C. 書 D. 新聞報道 (Literacy Areas: 4,7,8)</p>
<p>11. 當我們在作業中運用到不同來源的資料，可以如何使用？</p> <p>A. 在參考資料的部分加上作者的名字、標題和來源 B. 詢問作者並取得授權 C. 不用任何行動 D. 在作業中提及作者名字. (Literacy Areas: 1,4,5,8)</p>	<p>12. 以下哪一個搜尋會得到最少的結果？</p> <p>A. Traditional AND Hong Kong Shop B. Traditional OR Hong Kong Shop C. “Traditional Hong Kong Shop” (Literacy Areas: 3,6)</p>

Appendix 4: Survey on the integration of IL in ICT lessons

資訊素養研究問卷

1. 性別:

☐ 男 ☐ 女

2. 年級:

☐ S3A ☐ S3B

3. 在資訊素養研究的課堂開始前你知道什麼是資訊素養嗎?

☐ 是 ☐ 否

4. 請以 1-5 評分 (1 為最低分; 5 為最高分), 有關你在接觸資訊素養這個課題前的資訊素養技巧。(請圈出適當的分數)

(a) 搜尋技巧(包括利用關鍵字或是運算符號)	1	2	3	4	5
(b) 指出資訊來源的可靠性或準確性	1	2	3	4	5
(c) 分辨正確的資訊和避免接收虛假資訊	1	2	3	4	5
(d) 了解何謂「抄襲」和如何避免抄襲	1	2	3	4	5
(e) 了解版權和知識產權	1	2	3	4	5

5. 請以 1-5 評分 (1 為最低分; 5 為最高分), 有關你在接觸資訊素養這個課題後的資訊素養技巧。(請圈出適當的分數)

(a) 搜尋技巧(包括利用關鍵字或是運算符號)	1	2	3	4	5
(b) 指出資訊來源的可靠性或準確性	1	2	3	4	5
(c) 分辨正確的資訊和避免接收虛假資訊	1	2	3	4	5
(d) 了解何謂「抄襲」和如何避免抄襲	1	2	3	4	5
(e) 了解版權和知識產權	1	2	3	4	5

6. 在現代的生活你認為資訊素養重要嗎?

☐ 非常重要 ☐ 重要 ☐ 中立 ☐ 不重要 ☐ 非常不重要

7. 請由 1-5 排列出你對資訊素養的重要程度 (1: 最重要; 5: 最不重要).

搜尋技巧	
指出資訊來源的可靠性或準確性的技巧	
分辨正確的資訊的技巧	
避免抄襲	
避免違反版權和知識產權	

8. 你認為資訊素養有助你未來的升學就業嗎？（專上教育、工作、終身學習…）

☐ 是 ☐ 否

9. 請由 1-5 排列出資訊素養在生活中應用的重要程度（1: 最重要; 5: 最不重要）

在互聯網搜尋新聞	
完成專題報告或作業	
在社交媒體中接收資訊	
在互聯網中尋找熱門的話題	
學習新知識	

10. 在學習資訊素養的技巧後你會把技巧應用在日常生活中嗎？

☐ 會 ☐ 否

11. 你還想在課堂中加入什麼有關資訊素養的內容嗎？

12. 其他意見：

Appendix 5: Questions of interview

1. 在教授資訊素養的電腦課中，你認為哪一個課題最能用於你的日常生活中？為什麼？

Within the topics I have taught in the information literacy sessions in ICT lessons, what topics do you think you can apply to your daily life most? Why?

2. 在教授資訊素養的電腦課中，你認為哪一個課題最能令你增加對資訊素養的認識？為什麼？

Within the topics I have taught in the information literacy sessions in ICT lessons, what topics do you think can raise your understanding of IL? Why?

3. 你認為分辨可靠的資訊來源和搜尋技巧哪一樣比較重要？為什麼？

Do you think to distinguish reliable sources of information and search strategies, which is more important? Why?

4. 你在課程之前知道什麼是知識產權嗎？你在日常生活中會應用到嗎？你認為知識產權重要嗎？

Did you understand what Intellectual Property is before the lessons? Will you use the knowledge in your daily life, and do you think that it is essential?

5. 在你日常的應用中，哪裡應用可以最能發揮到資訊素養的技能？你會怎樣運用？
- Which of the skills of IL can you apply in your daily life most? How do you use the skills?

6. 在日後的升學就業上，你可以如何應用資訊素養的技能？

How can you apply the skills of IL in your future career?

7. 在課程後，你還想了解更多資訊素養的知識嗎？

After the lessons, do you want to know more about the knowledge and skills of IL?

Appendix 6: Class observation forms

Lesson observation form

Date: 20/11/2020	Class: 3B
Session title: Using reliable resources	Time: 10 minutes
Learning objectives: Students will be able to: <ol style="list-style-type: none">1. define the reliability of the internet resources by indicating the types of websites2. understand the domains of different organizations3. identify the unreliable internet resources	
What students have reacted in the lesson: <ol style="list-style-type: none">1. Ranking the reliability of internet resources by types of websites:<ul style="list-style-type: none">- When I was talking about the disadvantages of Wikipedia, the students shared that they always use the information from Wikipedia to finish homework.- Students had misunderstandings which Wikipedia is a reliable source with accurate information.- Students responded that they did not care about the intellectual property and copyrights, they have just copied all the paragraphs they needed and pasted to the homework.- Students shared that they knew how to classify the reliability of different newspaper.2. Website domains:<ul style="list-style-type: none">- Students can give some domains they knew such as “.edu” and “.com”.- Students may not clearly know what are the meanings that the domains represent.- Some students did not know the differences between “.org” and “.com”.3. Examples of the domains:<ul style="list-style-type: none">- Students knew that their school website includes the “.edu” domain.- After the introduction, students can give more examples on the commercial websites.	

Lesson observation form

Date: 17/11/2020	Class: 3A
Session title: Using reliable resources	Time: 10 minutes
Learning objectives: Students will be able to: <ol style="list-style-type: none">1. define the reliability of the internet resources by indicating the types of websites2. understand the domains of different organizations3. identify the unreliable internet resources	
What students have reacted in the lesson: <ol style="list-style-type: none">1. Ranking the reliability of internet resources by types of websites:<ul style="list-style-type: none">- Students shared that they used Wikipedia all the time including school homework or individual use.- Students did not care about the intellectual property and copyrights.- Students shared that they always get information through social media.2. Website domains:<ul style="list-style-type: none">- Students did not know the meaning of each domain.- Students did not know what the meaning of “organization” is.3. Examples of the domains:<ul style="list-style-type: none">- Students can give some examples after the introduction.	

Appendix 7: Transcript of the interview

Student A:

Teacher: Within the topics I have taught in the information literacy sessions in ICT lessons, what topics do you think you can apply to your daily life? Why?

Student: I think that searching skills are useful because we can use the searching operators to search the direct results. We can find the things we want more efficiently and reduce the time for accessing different sites. For example, we can search the whole sentences thoroughly by using operators.

Teacher: So, we can reduce the time for searching by using the searching operators.

Teacher: The second question is, what topics do you think can raise your understanding of IL? Why? It is different from the last question. This question is about the change in your understanding of IL.

Student: I think it is intellectual property. Because I usually download photos and videos from the internet, but I found it was violating intellectual property. So, I will be careful about whether the pictures and videos have copyrights or the authors allow people to download them.

Teacher: I know that many of our classmates do not use legal streaming platforms before. After I mentioned this issue, will you be willing to use the legal streaming platforms to watch videos or listen to music?

Student: Yes. In the past, I used illegal websites from China to watch videos. Now, I will subscribe to Netflix to watch films.

Teacher: Do you think to distinguish reliable sources of information and search strategies, which is more important? Why?

Student: I think that distinguish reliable sources of information is more critical. Because there is much fake news on the internet and many people talk about “fact check”. Although we check some information on the internet, it could be fake.

Teacher: Did you experience that you need to “fact check” to confirm information?

Student: Sometimes. Recently, some social networks sites mentioned that there are many side effects after injecting the COVID-19 vaccinee. There is a photo with four corners. The first three corners show the people with side effects, but the last corner is our CE. I think it is not reliable to tell people about the actual side effects.

Teacher: Did you understand what Intellectual Property is before the lessons? Will you use the knowledge in your daily life, and do you think that it is essential?

Student: I don't know much about Intellectual Property before. I only heard this term a few times before. After the lessons, I found that it is positively related to our daily life, such as searching for information for assignments and finding photos. We should state the sources and the authors. If I am the author and my works are spread without my permission, I will upset about it, and it violates my rights.

Teacher: Which of the skills of IL can you apply in your daily life most? How do you use the skills?

Student: Since we should use accurate information when we are searching for information. After I have learnt IL, I can identify the accuracy of the information. So I can avoid using the wrong information in my homework.

Teacher: How can you apply the skills of IL in your future career?

Student: We are going to choose electives subjects in senior grades. There are many websites for us to read. But the most reliable is the government website or some fake news website. There are many fake education companies, and they deceive students into joining their courses. We should be careful to search for the information we need.

Teacher: The last questions, after the lessons, do you want to know more about the knowledge and skills of IL?

Student: I think that there are not enough skills teaching during the lessons. Some of the skills just mentioned quickly. I think you should talk more about the details of Intellectual Property, such as the consequences.

Student B

Teacher: Within the topics I have taught in the information literacy sessions in ICT lessons, what topics do you think you can apply to your daily life? Why?

Student: I think that the most important is the accuracy of the information sources. In our daily life, we could see "content farm" in social media. There is much fake information, and it

is spread by many people. The information sources may not be reliable and accurate. If we access those websites, we will receive much fake information, such as the COVID-19 vaccine. After the lessons, I can identify reliable sources.

Teacher: OK. Then, the second question is, what topics do you think can raise your understanding of IL? Why? It is different from the last question. This question is about the change in your understanding of IL.

Student: I think I have raised my understanding of the searching strategies. For example, when I search for something on Google, I can use some symbols and operators to include or exclude the content we want and don't want. Then, we can get different results. For example, I search recipe with beef or without beef. I can use it in my daily life and reduce time.

Teacher: Did you use those searching strategies after I have taught?

Student: Yes. I have tried. When I want to buy something on the internet, I have used the strategies to search the cheaper products.

Teacher: Do you think to distinguish reliable sources of information and search strategies, which is more important? Why?

Student: I think that searching for strategies is more critical. If we do not get any results, how can we identify the information? It is the necessary skills for us. If we search by skills, it saves our time to identify.

Teacher: Did you understand what Intellectual Property is before the lessons? Will you use the knowledge in your daily life, and do you think that it is essential?

Student: I knew it before. I have heard that before, such as some youtube videos are reported and the videos are deleted. I think it is important. They are the authors' rights, and the authors are benefited from the works to earn money. If we do not respect them, the authors are discouraged from creating more works when they cannot make money.

Teacher: So, have you use any legal streaming platforms to watch videos or listen to music?

Student: Yes. I use Apple Music, and I heard that we could use Bilibili to watch legal animation.

Teacher: Which of the skills of IL can you apply in your daily life most? How do you use the skills?

Student: As you mentioned, we access social media like Facebook and online forum, we could use the skills a lot. But I can apply it a lot when I am doing assignments. Especially finding information for writing articles in Chinese lessons. Without those skills, it is difficult for us to handle our schoolwork.

Teacher: How can you apply the skills of IL in your future career?

Student: As you mentioned, we will search for information from the internet for our study. You also will use the skills in further studies.

Teacher: The last questions, after the lessons, do you want to know more about the knowledge and skills of IL?

Student: I think many examples are related to our daily life in the lessons. I hope I can learn more skills in IL in the future.

Student C:

Teacher: Within the topics I have taught in the information literacy sessions in ICT lessons, what topics do you think you can apply to your daily life? Why?

Student: I think that is the topic on identify the reliable and accurate information sources. Because when are doing homework or in our daily life, we can receive much information. Especially in recent years, there is much information for us to identify and indicate and we are easily received fake and misleading information to affect the opinions of a specific issue. We can use IL to avoid receiving fake information.

Teacher: The second question is, what topics do you think can raise your understanding of IL? Why? Student: It is different from the last question. This question is about the change in your understanding of IL.

Student: Identify different websites. As I mentioned before, if we can identify different websites, we also can identify different sources. For example, before I had the lessons on IL, I always used Wikipedia to be the reference of my homework. But I never knew Wikipedia can be edited by anyone on the internet. After I knew more about the topic, I understood that I can use more reliable and accurate information sources.

Teacher: Do you think to distinguish reliable sources of information and search strategies, which is more important? Why?

Student: I think that searching skill is more important. Because we need to know “how to search”. If they grasp the skills, they can filter from the searching results and get useful information. This is the basic step of searching information.

Teacher: Do you remember the searching skill?

Student: We can add the “ “ and the date.

Teacher: Did you understand what Intellectual Property is before the lessons? Will you use the knowledge in your daily life, and do you think that it is essential?

Student: I haven’t known before the lessons. But my friends always send me some music files from different sources or I always watch videos from YouTube. I knew that I may violate the IP every day. I think that it is important and we should respect to the authors. IP also can protect the rights of authors.

Teacher: Which of the skills of IL can you apply in your daily life most? How do you use the skills?

Student: I think I can use the skills of IL most when I go to social media. Because when we go to the social media, we may receive various information. There are many views from the social media and the information may not be correct. We should be careful of the sources and the domains of the website. Such as KK News, those content farm. Therefore, we can ensure that we receive accurate information.

Teacher: As you mentioned content farm, how often you access to those content farm?

Student: Sometimes. But I do not believe them. It’s just for entertaining.

Teacher: How can you apply the skills of IL in your future career?

Student: I would like to use the skills to search information for my future study. Such as I would find some schools and courses. We may be cheated by the companies and we should be careful. For example, we should check their official websites and the comments from different people.

Teacher: The last questions, after the lessons, do you want to know more about the knowledge and skills of IL?

Student: Yes. I think that the time is not enough, and the knowledge is limited. In the future, the skills and knowledge may not be enough for me to apply. So, I want to learn it more deeper.