Research on the Cultivation of Critical Thinking in the Review of Postgraduate Information Literacy for the Graduation Thesis: A View from an International Student

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Introduction

With the diversification of information and the rapid development of information technology, and the arrival of the era of big data, information literacy has become one of the basic qualities that everyone must possess (Galvin and Jeanne 2006). This paper presents information literacy and review writing, data access autonomy and academic exchange activities to discover and explore, and the benefits of sharing learning resources. The survey shows the evaluation results of students' autonomy of learning and discusses the importance of improving the literature search and assistance provided by campus institutions such as libraries, and through the practical experience of international students to illustrate the teamwork for academic exchanges between China and foreign countries. The cultivation of information literacy driven by academic tasks and review writing plays an important role in developing a mature and universally applicable learning style, which is of great benefit to the academic quality training of graduate students. Through the feedback questionnaire, the student's literature review ability and the mastery of advanced search ability are analyzed to help teachers or scholars review students' ability and provide teaching models.

As an important part of China's higher talents, graduate students have become an important part of the postgraduate education (Yi 2017). The research of postgraduate theses runs through most of the graduate study period, which is the result of the graduate students' innovation and scientific works, and also an important reference for obtaining a master's degree (Sun, Long, Chiang, Huang, Hou, and Yao 2018). The quality of the graduate students' research papers comprehensively reflects the ability of the graduate students to use information acquisition methods, tools and common technology databases to solve practical scientific research problems (Cuschieri, Grech, and Charles Savona-Ventura 2018). Therefore, the master's thesis is of great significance for evaluating the achievements of graduate students studying in China (Skeith, Ridinger, Srinivasan, Givi, Youssef and Harris 2018). Regarding information literacy, although many researchers around the world have done research on information literacy cultivation in different occasions and directions, the issues and focus of extensive discussion on the cultivation of research quality of international students can be summarized as follows (Veach 2009):

- Graduate students and groups have mastered the information retrieval skills
- Teachers' role in information literacy development
- The influence of group effect and culture on the cultivation of information quality

The focus of this paper is that the relevance of information literacy practices stems from the daily research needs of international students, which can effectively link information literacy with learning organizations. The information literacy is interpreted as the relationship between international students and literature review. When it comes to features, its
cultivation becomes apparent, and these include (England and Pasco 2005):

- Constant emphasis on tool usage
- Emphasize the internalization of the purpose of cultivation as a capability rather than a specific skill
- Rely on social and teamwork, not only personal ability
- Emphasize initiative rather than stylized application.

**International Graduate Students in China**

In recent years, the total number of overseas students in China, the number of countries and regions of the incoming of overseas students, the number of foreign students accepted in China, and the number of foreign students receiving the Chinese government scholarship have all reached new heights. Especially after “The Belt and Road” development strategy was put forward, the education of international students in China showed the following new features (Aoyama and Rumi 2017).

First, the countries along “The Belt and Road” are becoming the main source countries for international students. The multi-country cooperation initiative proposed by Chinese President Xi Jinping in 2013 will fully rely on the existing dual multilateral mechanisms of China and relevant countries, and actively develop the economy of these countries with the help of existing and effective regional cooperation platforms. Partnership initiatives aim to create a community of political mutual trust, economic integration, culturally inclusive interests, a community of destiny and a community of responsibility. Among the top 10 countries in China, the number of students from Korea, Pakistan and Kazakhstan has increased, with India, Pakistan and Kazakhstan both growing by more than 10%. The number of students from Asia and Africa increased by 6.5% and 19.47% respectively over the previous year.

Secondly, the number of international students has increased year by year, and the structure of students has been continuously optimized. In 2015, there were 184,799 foreign students receiving academic education in China, an increase of 20,405 from 2014, representing 12.41% from the same period of last year; the number of students in 2015 accounted for the total number of students in China. The proportion was 46.47%, of which the proportion of graduate students in the total number of students was 13.47%, both of which were higher than those in 2014. Table 1 shows the graduation details of the international graduate students studying in Harbin Engineering University in recent years.

<table>
<thead>
<tr>
<th>Years</th>
<th>MA's Actual Number</th>
<th>Delayed Graduation</th>
<th>Ph.D.'s Actual Number</th>
<th>Delayed Graduation</th>
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<tr>
<td>2012</td>
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<td>14</td>
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<td>2013</td>
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<td>2014</td>
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<td>2015</td>
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<td>2016</td>
<td>51</td>
<td>49</td>
<td>17</td>
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<td>2017</td>
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<td>3</td>
<td>No Data</td>
<td>No Data</td>
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</table>

As can be seen from the above data for engineering universities, academic education is already the main form of graduate study abroad. Obtaining a degree is a landmark test for international student education. The qualitative change of the goal and orientation of international student education will force us to comprehensively examine and enhance the quality of international student training with a broader international perspective (Wu and Hantian 2018). Therefore, it is full of challenges and major opportunities.

However, due to language communication barriers, multicultural collisions, the impact of different values, the integration of professional basic knowledge and the competitive theory directly reflect all aspects of the postgraduate training process. It can be seen from the table that some international students are still deferred to obtain a degree for various reasons every year.

The papers on academic misconduct in China are the common practice of scientific research in line with the usual international practice. With the upgrade of detection technology, it is also forced to strengthen the
process management of the dissertation written articles (Tsai and Wang 2016).

**Analysis of Research Status at Home and Abroad**

The literature review is an academic paper written after comprehensive analysis by collecting a large amount of literature on a certain topic. It is a kind of scientific literature which is a reflection of the latest developments, the academic insights, and the recommendations of a particular subject or topic in a particular field. It often reflects new developments, new trends, new levels, new principles and new technologies related to the problem (Wang 2010).

The following principles should be followed in the literature review (Cui 2007): 5W principle, classic principle, document tree principle, top principle and singular principle. The literature review generally goes through the following stages: selection of topics, collection of reading literature, induction-collection-analysis and writing. The following mainly discusses about collecting literature and induction-collection-analysis (Hai 2010; Holland 2010; Ostriker 2010; Zhu 2010).

The methods for collecting literature include monographs, yearbook methods, browsing methods, snowball methods, review articles, monographs, textbooks, and other references, newer master's thesis and search methods, and so on. The more complete the collection of literature requirements, the better will be the result. The sources can be CA, GOOGLE, etc. One of the most used sources is the web of knowledge (SCI) (Ni 2010; Liao 2009). For the Induction-Organization-Analysis, firstly, the representative, scientific, relevant and reliable literature reading should be selected from the collected documents. In the meanwhile, it is suggested to write the "reading notes" and "reading experience". The final step is to write down the revelations, experiences, and ideas gained from reading and extract the essence of the literature.

For patents, there are free websites of countries such as national IP offices; there are also charged patent databases such as DELPHION, AUREKA, DIALOG, STN, QUESTEL-ORBIT, and the most authoritative Derwent World Patents Index database, CA of the United States which is mainly for chemistry, the PharmPat drug database in France, the Chinese medicine database made by China National Intellectual Property Publishing House, the world traditional medicine database made by Beijing Oriental Lingdun Technology Co., Ltd., CNNIC, National Natural Science Foundation of China. Portals, and so on (Wang 2017; Wang 2016; Zhao 2016; Chen 2010; Yue 2009; Zhou 2009).

**The Status of Critical Thinking and Information Quality**

From the end of the 1980s, China began to introduce the concept of "critical thinking", translating and publishing foreign related works and papers. The translations mainly include "critical thinking" (1989), "Learn from Mistakes" (1994). Domestic scholars have summarized the content, structure, teaching and other contents of critical thinking. For example, Chen Qi, Yang Qing, Zhu Zhixian and Professor Lin Chongde have repeatedly mentioned critical thinking in their psychological works. Research on the curriculum of critical thinking has also been carried out in research (Long 2017).

At present, information quality is expressed in Information Literacy in most English literature (Han 2012; Yang 2010). In 2002, the third meeting of the University Library and Information Work Committee of the Ministry of Education listed information quality education as an important topic for discussion. In 2004, the theme of the annual meeting of the Chinese Library Association was “Information Quality Education and Library Information Service”. One of the six research themes of the Journal of Books and Information in Taiwan from 1996 to 2003 was “the use of education and information literacy in school libraries”.

Tuhe Linghui of Sun Yat-sen University used the bibliometric method and the literature content analysis method to analyze the research literature on online information literacy education in China from 1990 to 2006. It pointed out that since 1999, the related papers (5 articles) have appeared, and reached the climax in 2004 (40 articles). Subsequent research has gradually slowed
down. At present, China's only online information quality education platform is “Beijing University Information Quality Education Corner”.

The research on information quality in China is mainly distributed in the field of university libraries. The most relevant research content is also limited to the library business. In fact, with the development of the Internet, especially the display applications of the mobile Internet and the Internet of Things, the information literacy of young people, especially college students, as the main audience in the information audience and publisher community has been unprecedentedly challenged. Domestic online information literacy education pays more attention to the mastery of simple skills such as retrieval skills, literature acquisition and utilization, while ignoring the monitoring of self-learning process. It does not emphasize on the teacher-student interaction (Liu, Quan and Zhang 2001).

A summary of the characteristics of the summary writing of graduate students' degree thesis in China was conducted by Simmie, Mooney, Paor, Liston and O'Shea (2017) who noted the following:

1) Listing the opinions of others, without classification, induction and refinement; it is difficult to grasp the frontier areas of the subject as a whole;
2) Although the existing achievements are summarized, the purpose of capturing innovation opportunities through analysis cannot be achieved;
3) The refinement of the problem is not precise enough;
4) Exaggerating the problems of predecessors;
5) Concealing aspects related to their own topics;
6) Due to cultural, linguistic or religious reasons, some documents cannot be searched, read and evaluated; for example, some graduate students studying abroad cannot use Chinese inquiries and cannot do thorough reading comprehension;
7) The impact of cross-cultural communication vacancies;
8) Due to religious or individual reasons, students spend a lot of time as spare time, which is also one of the reasons;
9) The basics of professional knowledge are poor.

The Importance of Critical Information Quality Cultivation

Studying the process characteristics of the literature review of graduate students' dissertations/theses and the cultivation of critical information literacy, has important academic value, and summarizes the rules of the acquisition and evaluation of literature information based on the factors such as the mother tongue of the graduate students studying abroad and their home country culture (Wee and Bert Van 2015). It helps to clarify the influencing factors of cross-cultural communication on the writing of postgraduate review papers, and thus reflects the feedback, the motivation, and the multi-objective comprehensive investigation of innovative thinking in the process of constructing critical information quality. It is a unique academic highlight of the intersection of disciplines (Moon and Dreama 1996).

It is of urgent practical significance to study the process characteristics of the literature review of graduate students' dissertations and critical information quality, because the students in China are the most important factors in the economic cooperation and humanities exchange booster in the “Belt and Road” strategy (Liu, Weidong, and Dunford 2016). To accomplish this strategy, economic cooperation and humanities exchange urgently need a large number of composite talents with Chinese complex, Chinese imprint, and professionals in the key fields. The processing characteristics of the literature review of graduate students' dissertations and the cultivation of critical information quality can help in improving their complexities (Manatos, Sarrico and Rosa 2015). The ability to efficiently filter and collect information can cultivate innovative abilities and significantly improve the scientific literacy. This will lay the foundation for the graduate students to become the top talents with international vision.

Studying the process characteristics of the literature review of graduate students' dissertations and the cultivation of critical information literacy have broad application prospects. They are not only suitable for postgraduate students studying in China, but also in the process of programmatic, systematic and technical
handling (Koseogle and Aras 2018). The thinking of all graduate students and their abilities to filter information culture also have important references. Judging from the results of the existing five years of practice, it can be predicted that this efficient and critical information quality cultivation will have a substantial and effective improvement of the overall academic ability of graduate students studying abroad.

Methodology

The American Library Association (ALA) defined information literacy in 1989 as the ability to recognize when information is needed and to efficiently search, evaluate, and use the information it needs. The five primary standards for information literacy stipulated in the American University Library Information Competency Standards (2000) are: the ability to determine the nature and scope of the information required; the effective access to the information needed; the assessment and selection of information and integration owned knowledge base; able to effectively use information to achieve specific goals; be able to familiarize with economic, legal, and social issues related to the use of information; obtain information reasonably and legally. The American Academy and School Association Southern College Committee defines information literacy as the ability to identify, evaluate, and utilize information to become independent lifelong learners.

The United States and some Western countries (such as Australia) have given practical evidence to the education of information literacy at various stages of education. For professional courses in various disciplines and academic fields, some foreign universities have integrated them with information literacy courses. Various information platforms on information literacy, electronic windows, and online teaching have emerged (Liu 2016).

The literacy education of foreign information mainly has the following characteristics: it has a special organization, indirectly promotes school education reform, focuses on cooperation, fancy scientific research quality practice, and actively participates from education practitioners to students (Bruce 2000). Since the implementation of information literacy in foreign countries, the direction of students' social value and human-oriented factors has been highlighted (Dearden 2000). It can be summarized as information-based acquisition, focusing on the cultivation of research ability and moral quality—these aspects are worth learning (Hartmann 2001).

The many contemporary developments in information literacy programs and research suggest that considerable energy is being expended in this area. The idea is beginning to move beyond the educational sector, which has been its primary home for twenty years or more, into the workplace and community. Due to the deep understanding and practical experience of professional characteristics, information environment and user interaction and cooperation, library scholars are still the initiators of most information quality cultivation. However, due to the teaching mode of Chinese universities, the information cultivation of librarians cannot be understood. Effectively delivered to the classroom, the instructors should absorb important insights from the cultivation of information quality, and work with relevant researchers in the library to determine the relevant links between professional students' needs and information quality and develop and nurture ways.

Based on the above criteria, a questionnaire was designed for the information quality and review writing of graduate students (Meijer 2013). A total of 123 doctoral and master’s degree students studying at Harbin Engineering University were randomly selected as research samples. The design of this survey question is divided into the degree of demand for information, the use of information acquisition and retrieval tools, the common knowledge of processing and processing of information, the transformation of information into its own research topics, information literacy, literature review and information. The classification of the survey question is elaborated in the Table 2.

Table 2: Classification of Questionnaire Topics

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<thead>
<tr>
<th>Topic</th>
<th>Quantity</th>
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### Message Requirement

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<td>2</td>
<td>1) Attitude to information 2) Whether it will be attracted by irrelevant information when getting information</td>
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### Document Retrieval

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<td>8</td>
<td>1) Main way to get the information 2) Mastering advanced computer retrieval 3) Weighing the cost and benefit of getting information 4) Main problem while querying information 5) Knowledge and skills of literature search 6) First factor to consider when retrieving information 7) Sources of information first retrieved</td>
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### Post Processing of Information

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<td>5</td>
<td>1) Efficiently classify obtained information 2) Judge authority, reliability, and timeliness of information 3) Filtering methods for retrieving large amounts of information 4) Channels used to keep track of new information</td>
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### Information Literacy and Achievement Transformation

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<td>4</td>
<td>1) Understand information literacy 2) Form new solutions to problems in learning and social life from information searched</td>
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### Writing, Literature Reviews and Dissertation

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<td>2</td>
<td>1) Approach to managing literature in the process of writing a literature review 2) Identify main difficulties in writing a dissertation</td>
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### Survey objects and results

Based on the above five criteria, a questionnaire was designed for the information quality and review writing of graduate students. A total of 123 doctoral or postgraduate students studying at Harbin Engineering University were randomly selected as research samples. After they submitted their responses to the given questionnaire, each submitted sample was reviewed thoroughly. For a better understanding of the results, percentage system is used to showcase the extent of selection of each option of answer provided to each question. The result of the questionnaire was obtained as shown below:

### The innovation and thinking of the questionnaire

This questionnaire broke out many questions about information literacy and the completion of the dissertation. 45.65% of the respondents were still in a passive state, and they needed to send out the latest invitations or updates through others or social forces. 36.59% of the students did not understand the information literacy, 52.03% just had a little idea; 43.05% of the students were not familiar with the computer operation knowledge needed to retrieve the information; 13.82% of the students could not weigh the information to obtain the research progress on their own pros and cons; only half of the students had information literacy at the undergraduate level; 3.25% had insufficient knowledge of the literature search skills; 5% of the students could not effectively evaluate the
information sources they summarized in a timely manner; 4.88% of the students could not judge the information because of issues mounting to the authority, the reliability, the time-sensitiveness; 18.7% did not use RSS and other tools to subscribe to the original channel of information; 2.44% of students in the paper used other people's literature and did not pay attention to the references.

In response to the above-mentioned questions raised, schools should strengthen the construction of information literacy environment, including multimedia network classrooms, libraries, campus networks, and electronic information materials rooms to provide a good environment for graduate students. Online education is not limited by location and time, but also its transmission speed, which is fast and, can fully mobilize the enthusiasm of students to learn. Schools should make full use of the school network, launch a special website for postgraduate information literacy education, build a library portal and information service system, and provide students with comprehensive professional search services, information navigation services, and topic tracking services, respectively. In short, schools should pay attention to their internal resource construction. For the school's important scientific research results, excellent courses, and wonderful lectures, they can be recorded by means of cameras, networks, etc., and search systems, CD-ROM databases, etc., to build the school's multimedia knowledge, like libraries and archives. The library should supplement and adjust various literature materials in a timely manner according to the actual needs of graduate students of various disciplines (Zhuo 2007). Regarding the translation problems faced by foreign students in the literature review, an automatic solution (such as online dictionary translation) and manual participation solutions (such as Chinese students help-interactive translation) for the lack of Chinese literature review process should be proposed such as SCI and dedicated databases and open source databases e.g. google and Baidu, and methods for recording, citing, and evaluating documents by the note-type document recording software (Palmer 2004).

Teachers should also give a literature review process and performance evaluation method based on feedback theory, which is suitable for the diversified, multi-level and religious characteristics of graduate students studying abroad. Schools and educational institutions should present a method of writing a mixed literature review that can best prevent academic misconduct.

An international graduate student’s review on the training process of critical information literacy in the literature review for the dissertation

An international student is randomly selected as the representative of the international students in China and his/her experiences regarding to the graduate studies abroad are shared. He/she first arrived to China in 2012 for pursuing his/her Bachelor’s Degree in Mechanical Engineering at the Nanjing University of Aeronautics and Astronautics. He/she came as a self-financed student but due to his/her best academic and extracurricular records, he/she was awarded the “Nanjing Government Provincial Scholarship” and the “Chinese Government Scholarship for the Outstanding International Students”. He/she then graduated in 2016 and got a university funded scholarship at the Harbin Engineering University, China to pursue a master's degree. He/she is a graduate student carrying out his/her research in “Flexible Robotics” under the department of Mechanical Engineering and is expected to graduate by June 2019.

Tools used in the information retrieval process

Through a certain stage of information literacy cultivation in China, he/she got to know a lot about literature retrieval and information acquisition, which was of great benefit to his/her thesis literature review writing. By looking up the relevant information on the Internet, he/she had a deep understanding of the basic principles of the computer networks and gained a preliminary understanding of advanced retrieval.

For example, he/she searched the CNKI database and the SCI database in combination with the direction of his/her topic “soft robotics” and made a statistical understanding of the research directions, the subject classifications, and the interdisciplinary situation of soft robots. According to him/her, overview writing provided
a direction for making his/her papers more innovative, and gradually allowing to discriminate between the authoritativeness and timeliness of the scientific and the technological information in the field of soft robotics. The figures 3 and 4 are the flowchart and procedures explaining the use of the CNKI, the web of knowledge (SCI) and the NoteExpress/Endnote.

Elimination of cultural differences through interaction of International and Chinese students

China has become the academic hub for many international students from several countries around the world due to which the cultural variation is easily seen in the university (Martinez 2006). The elimination of cultural differences is the main purpose of the cross-cultural method used in the study and during the organized extra-curricular activities for the students (Djerasimovic 2014). Exchanging various learning methods and sharing technical knowledge and experiences, for example: using different software, theoretical and experimental aspects, and so on can help bring out innovative ideas (Li 2014). This concept can revolutionize the learning pattern of both home and overseas students/scholars in a cross-cultural environment. The figure 5 shows the academic discussion programs held between international and Chinese students/scholars and lecturers.

References


Liu, Ruimin. (2016) "Heilongjiang University Graduate Student Information Literacy Survey Analysis." *Heilongjiang daxue xuebao*


