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Undergraduate Students' Use of Online Information in World Geography: Source Types and Selection Criteria

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Abstract

Offering up-to-date information and diverse perspectives on issues, online information can be a valuable resource that supplements traditional course materials like textbooks. In this paper, the source types that students' use for a course assignment and the criteria they apply to determine usefulness of the online information are examined. Sixty-five undergraduate students enrolled in a world geography course in fall 2015 were asked to search for 20 sources of online information about recent changes in oil prices and then to rank the sources based on their usefulness for understanding the topic. The findings will provide instructors with insights for guiding students' appropriate use of online information for academic tasks and lifelong learning.

Keywords

Online Resources; Information Literacy; Undergraduate Students; World Geograph

We currently live in an information-rich age in which new information is produced and published every second, and anyone can access a variety of information on the internet easily. This online information can be useful, and it is important to make teaching and developing learning materials available at all times (Reed & Mitchell, 2001; Stewart, Stott, & Nuttall, 2011). Encompassing a wide range of information on

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the internet, including webpages, articles, data, videos, and documents, online information is frequently and widely used in higher education (Eynon, 2005; Kirkwood, 2008; Lee, Paik, & Joo, 2012; Maloney, 2007; Selwyn, 2008). An instructor can use online information as supplemental materials in the classroom or ask students to use it for assignments such as research papers and projects. Some students autonomously use online information to understand a course topic better.

Although the content of geography courses varies considerably, using online information can be highly relevant in any course if the course topic deals with various contemporary issues that range from local to global in scale. For example, world geography courses can benefit from the inclusion of online information, as one of the common objectives of such courses is to understand and analyse current world issues from in terms of geography (Jo, Hong, & Verma, 2016; Klein, 2003). Information and data in world geography textbooks becomes outdated rapidly and often fails to offer diverse perspectives about issues (Rees & Legates, 2013; Wong, 1998). On the contrary, it is relatively easy to find up-to-date information and broader perspectives on issues on the internet. Therefore, online information sources become useful resources in teaching and learning world geography.

According to Ritter and Lemke (2000), searching for online information outside of the given materials in a classroom facilitates active learning. Activities or assignments involved in using online information in a world geography course (i.e., searching the internet to find information about a certain country or using online news to find a local case example that demonstrates a global issue) can promote student-centred learning (Steinberg, Walter, & Sherman-Morris, 2002) and support the construction of meaningful knowledge (Klein, 2003). Various types of resources such as images, photos, maps and video clips that are available online can also help students discover and understand geographical concepts and processes (McMorrow, 2005). For such reasons, several geographers have suggested using online information as classroom materials, and many geography instructors have been using it in their classrooms.

However, simply consuming online information does not guarantee the promotion of students' learning (Ritter & Lemke, 2000). Since the internet has been widely used in higher education, many geographers have emphasized that students need to learn how to find online information and evaluate its quality for its effective and educational use (Bullard, 1998; Castleford and Robinson, 1998; Chrisman & Harvey, 1998; Newnham et al., 1998). Furthermore, Goett and Foote (2000) also stressed the importance of training students to assess the quality of online information for learning geography, which includes considering factors such as purpose, author or publisher, cited sources and other sources of information, and publication date. For teaching such skills to students, various approaches (e.g., inviting librarians to classes as guest lecturers, offering credit or non-credit courses in online information, and providing informal workshops) have been suggested and implemented in higher education (Johnston & Webber, 2003; McDowell, 2002).

Students are often asked to search for online information related to a course's topic to complete assignments or projects. Therefore, examining whether students have the

ability to select useful online information is important for supporting students' understanding and acquisition of content knowledge. Researchers in various fields have been interested in students' online information selection behaviours and patterns (Hsu et al., 2014; Kirkwood, 2008; Leeder & Shah, 2016). In the field of geography, Stewart, Stott, and Nuttall (2011) investigated relationships between students' online information use patterns and their academic performance in two undergraduate geography courses in the United Kingdom. The results indicated that most students use relevant online information only to complete assignments or prepare for exams. Few students voluntarily used online information as supplementary or recommended materials when given the option to do so. In other words, students considered materials as important and used them only when those materials were necessary for assignments or for assessment purposes. Therefore, the authors suggested that instructors need to design courses that require students to use online information for assignments and/or exams throughout the course if using online information is critical for learning for that assignment. Kirkwood (2008) also found that students were only required or encouraged to use online information for assessment and rarely used optional sources of online information.

How do students select and use online information that is part of a course assignment or assessment? Using the present study, we wanted to identify undergraduate students' online information selection patterns in an academic setting, particularly in a world geography course. The objectives of this study were: 1) to identify the types of online information that students frequently use for understanding a global issue in world geography and 2) to understand the criteria that students apply to evaluate the usefulness of online information. These findings may provide valuable information for determining ways of using online information to improve students' understanding of content knowledge. A case study was conducted with 65 students who took a world geography course in fall 2015. The students completed an extra-credit assignment searching for 20 sources of online information regarding changes in oil prices. They then evaluated the usefulness of the selected sources using their own judgement. The following research questions guided this study:

1) What types of online information sources do students use more frequently and consider more useful for understanding a global issue in world geography?
2) Which criteria do students apply to determine the usefulness of an online information source?

Background

Since the mid-1990s, the internet has been used in higher education to improve students' learning experiences and to offer diverse learning opportunities (Eynon, 2005; Gardner, 2003). Many scholars have reported that the internet is helpful for teaching and learning in higher education as a source of information or a method of communication (Reed & Mitchell, 2001; Solem, 2000; Stewart, Stott, & Nuttall, 2011). Using the internet, students can access course materials from an online learning environment, communicate with an instructor and classmates via email, and search for

the information they may need for their coursework (Eynon, 2005; Selwyn, 2008). Currently, the internet is an indispensable tool and source of information in higher education, so it is difficult to imagine teaching and learning in higher education without it (Maloney, 2007).

As 'digital natives' (Prensky, 2001, p. 1), today's undergraduate students have been born and raised in the digital world. Their lives have been enclosed by technologies such as computers, cell phones, and video games; communication via these technologies (e.g., internet and instant messages) have occupied majority of their lives (Prensky, 2005). Therefore, digital natives tend to seek information from the internet naturally and often excessively depend on it (McMillan & Morrison, 2006; Weiler, 2005). Undergraduate students frequently use the internet as a source of information for their coursework rather than materials from traditional libraries (Eynon, 2005; Selwyn, 2008). Furthermore, students tend to use online information sources for their academic tasks more often than traditional paper-based resources. Several survey results indicate that large numbers of students use online information sources frequently or exclusively for their class assignments (Dilevko & Gottlieb, 2002; Ebersole, 2005; Lee, Han, & Joo, 2008; Lee, Paik, & Joo, 2012; Tomaiuolo, 2005; Xie & Joo, 2009). Certainly, students receive various educational benefits from using online information sources, such as finding information that they are interested in and obtaining the most up-to-date information from the internet (Tsai, Hsu, & Tsai, 2012). As a twenty-first century skill, information-seeking and -evaluation and problem-solving skills are important for promoting students' academic performance (Raes, Schellens, De Wever, & Vanderhoven, 2012).

Although students use the internet proficiently and find information from online sources freely, the effective use of the internet in the classroom is poorly understood (Kirkwood & Price, 2005; Taffs & Holt, 2013). Specifically, Head and Eisenberg (2009) reported that students had twice as much difficulty with searching and assessing online information sources related to their courses than to their daily life activities in the areas of finance, politics, wellness, and career. Indeed, several studies have reported that undergraduate students lack the understanding and skills needed to use online information sources for learning (McMillan & Morrison, 2006; Rowlands et al., 2008). According to Connaway, Dickey, and Radford (2011), when students use online information sources, they do not consider their quality. Moreover, as shown by Dilevko and Gottlieb (2002), students prefer to use online information sources even though they consider them to be less reliable and think that they provide less detailed information than do printed sources. The easy accessibility of online information sources is the main reason that students like to use them, regardless of their qualities (Joo & Choi, 2015). Students also tend not to validate online information sources' credibility; rather, they often evaluate the majority of online information sources as being reliable information (Taylor, 2012).

Therefore, the disparity between students' ability to use online information sources for learning and their instructors' anticipation of those uses has been an issue (Saunders, 2012). Some instructors have not been aware of students' actual ability to search and

evaluate online information sources academically (Saunders, 2012). Since every student has a different level of ability, it is difficult to plan curriculum accordingly (Weiler, 2005). As stated by Tomaiuolo (2005), instructors consider only approximately half of the online information sources students' use for a research paper to be appropriate; they deem the other half as unreliable and unacceptable. For this reason, instructors prefer that students only use approved online information sources, including electronic journal articles provided by the instructors (McDowell, 2002). However, this regulated approach could hinder students from becoming 'independent information users' (McDowell, 2002, p. 264).

To use online information sources effectively for learning, students should know how to search for, evaluate, and select appropriate sources (Leeder & Shah, 2016). Therefore, teaching information literacy is critical in higher education (Kirkwood, 2008). In teaching information literacy, some instructors concentrate only on training students how to reference academic sources such as referred journal articles (McDowell, 2002). However, education guides should help individuals become information-literate, with the ability to search for, assesses, and use desired information effectively (American Library Association, 1989). In order to be information-literate, students need to learn how to assess the credibility of online information sources, to understand how the creation and distribution processes of online information sources depend on different objectives, and to be aware of the value of information (American Library Association, 2016).

Methodology

Research Design

A pilot study was conducted with 15 undergraduate students prior to the main study. The purpose was to refine the research design and the instrument. The main study was conducted with students enrolled in a world geography class in fall 2015. Participation was voluntary. Among a total of 125 students enrolled in the class, 65 students participated in this study by completing an extra-credit assignment. The task involved finding and evaluating online information sources on the topic of changing oil prices. The initial number of participants was 89, but 24 responses were excluded from the final analysis because they did not contain all of the required information. The assignment format was chosen for the task rather than other research methods such as surveys and interviews because we were interested in learning which online information sources students select and determine to be useful in the process of completing their course assignments in a real academic setting as described the above. Among the 65 students, there were 36 freshmen (Year 1), 19 sophomores (Year 2), five juniors (Year 3), three seniors (Year 4), and two post-baccalaureate students; the majority (84.6%) of the participating students in this study comprised freshmen or sophomores. The 65 students were from various departments; more than 50% of the students were from interdisciplinary studies (22 students: 33.8%) and international studies (13 students: 20%).

Participants were asked to search for 20 online information sources on the topic of changes in oil prices, specifically related to which situations change oil prices, what the consequences and effects of changing oil prices are, and what the future trend in oil prices will be. Since changes in oil prices was important content in the North Africa and Southwest Asia unit and useful to explain the global economy, it was chosen as a topic of this study. Students filled out a table to provide information about the sources they found, including each source's title, uniform resource locator (URL), and type and a summary of the source's information. Then students ranked the sources from one (the most useful) to 20 (the least useful) using their own judgement. Students were also asked to provide rationales for their judgments of each source.

Based on the results of the pilot study, a list of 13 online information source types were provided for students to select from along with the following examples:

- Articles on broadcast-channel sites (e.g., ABC, BBC, and CNN)
- Articles on magazine sites (e.g., Fortune, Economist, and Forbes)
- Articles on newspaper sites (e.g., New York Times, USA Today, and Wall Street Journal)
- Articles on online news sites (e.g., Vox.com and MarketWatch)
- Articles on radio station sites (e.g., NPR and PBS)
- Instructional sites (e.g., For Dummies and HowStuffWorks)
- Online discussion forums
- Organizational webpages
- Personal blogs or webpages
- Scholarly journals found using Google Scholar, scholarly online databases, or digital libraries
- Social question-and-answer services (e.g., Yahoo Answers)
- Wikipedia/online encyclopaedias
- Others (e.g., Google Books and YouTube)

Because of the nature of the topic of this assignment—changes in oil prices—most of the sources that students found during the pilot study were news articles from various sites. To examine the detailed characteristics of the types of sources students used, news articles were separated into multiple categories, including broadcast channels, magazines, newspapers, online news, and radio station sites.

Participants were also given a list of reasons for ranking sources with their definitions, as in Table 1. The instructor of the course explained each of the reasons to the students to reduce confusion. The list was based on the literature and the results of the pilot study. Several scholars have reported that various factors affect student selection (e.g., accessibility, ease of understanding, familiarity, free use, currency, comprehensiveness, credibility, and how interesting the source is to read) and their choice not to select a certain source (e.g., inaccessibility, difficultness of understanding, unfamiliarity, cost of use, outdatedness, incomprehensiveness, and inaccuracy) (Burton & Chadwick, 2000; Kim & Sin, 2007; Lee, Paik, & Joo, 2012). Particularly, Lee, Paik, and Joo (2012) analysed students' online information source selection diaries to identify

the various factors that they used to complete the information-search tasks and found that students frequently used selection factors such as credibility, coverage, ease of understanding, and accessibility, and a definition of each factor was identifiable in the students' diaries. In this study, we borrowed the same definition reported in Lee, Paik, and Joo (2012). Since we were interested in students' evaluations and perspectives on which online information sources are not useful, we added reasons about the lack of usefulness that were exactly opposite to those reasons related to usefulness and their definitions.

Table 1
A list of reasons for evaluating a resource to be useful or not useful. Definitions adopted from Lee, Paik, and Joo (2012)

	Reason	Definition
For useful resources	Accessible	The resource is easily and quickly found and available.
	Comprehensive	The resource provides broad and detailed information that others do not cover.
	Credible	The information from the resource is correct and reliable.
	Easy to understand	The resource is clear.
	Organized	The information from the resource is efficiently structured.
	Interesting	The resource provides an appealing point of view.
	Updated	The resource includes current information.
For not useful resources	Inaccessible	The resource is found with difficulty.
	Limited	The resource provides less detailed information.
	Unreliable	The information from the resource seems incorrect.
	Difficult to understand	The resource is confusing.
	Disorganized	The information from the resource is poorly organized.
	Boring	The information from the resource is too general and typical.
	Outdated	The resource covers past information.

Students had approximately two weeks to complete the assignment. Each of the 65 students' tables with 20 online information sources and their usefulness ranks regarding the changes in oil prices were then collected. A total of 1,300 online information sources were used in this study. First, data from the students' tables were organized using Microsoft Excel. Then the source types that students preferred for the given assignment were identified, and their rankings were examined. Next, frequently mentioned reasons that a source was considered useful or not useful were investigated. Lastly, students' perspectives about various types of online information sources were

analysed using the frequently mentioned reasons that a source was considered useful or not useful. General patterns of online information source examples determined not to be useful as identified by students were also examined.

Findings and Discussion

What types of online information sources do students use more frequently and consider more useful for understanding a global issue in world geography?

To identify the types of online information sources that students preferred to use for the assigned task, the 1,300 sources were classified according to the 13 categories described earlier. Each source was checked to ensure that students had categorized them accurately. Among the 1,300 sources compiled, 702 were unique sources, and 599 sources were duplicated at least once. The maximum number of duplications for one source was 30. That is, 30 different students selected the same source. Students might have evaluated the same source differently, and as the aim of this study was to understand individual students' online information selection behaviour and perspectives for determining the usefulness of these sources, all duplicated sources were included for analysis. The high numbers of duplicated sources suggest that most students only examine online information listed on the first few pages of search results. Bloom and Deyrup (2015) found in their research that 50% of the students selected only online information sources searched on the first page of search results; those students did not go to the second page.

As shown in Table 2, of those 1,300 online information sources, the types of sources most-frequently used were articles from online news sites (255 sources: 19.62% of the total). Students searched for news articles from various sites, including online news, newspapers, magazines, and broadcast channel sites, and these source types made up 65.24% of the total online information sources that students selected. Students also used many sources from organizational webpages (220 resources: 16.92% of the total). These sources were mainly from for-profit and non-profit organizations related to oil, the financial industry, energy, and natural resources. Comparably, the types of sources less-frequently used were online discussion forums, social question-and-answer services, and personal blogs or webpages.

Table 2
Frequency of use and the usefulness rankings for resource types

Resource type	Frequency	Percentage	Usefulness ranking (1: the most useful; 20: the least useful)	
			AVG	SD
Online news sites	255	19.62%	11.21	5.57
Organizational webpages	220	16.92%	10.17	5.55
Newspaper sites	216	16.62%	9.89	5.67

Magazine sites	196	15.08%	9.99	5.74
Broadcasting sites	181	13.92%	10.09	5.82
Scholarly journals	59	4.54%	10.97	5.56
Instructional sites	47	3.62%	7.94	5.73
Others	38	2.92%	10.61	5.25
Radio station sites	28	2.15%	12.07	5.84
Wikipedia/Online encyclopedia	24	1.85%	11.54	6.22
Personal blogs/websites	20	1.54%	12.35	6.17
Social Q&A	15	1.15%	14	5.37
Online discussion forums	1	0.08%	9	-
Total	1300	100.00%		

Table 2 also shows the usefulness ranking of each source type as assigned by the students. The lower number represents sources considered to be more useful, and larger numbers represent items considered less useful. Among the 13 source types, students found sources from instructional sites to be the most useful (average ranking of 7.94/20) and sources from social question-and-answer services to be the least useful (average ranking of 14/20). The results show that students identified instructional sites as useful sources mainly because of how easy they are to understand and clear organization of information. One of the main goals of instructional sites is to explain key concepts and terms about a topic in a clear and understandable way. It is likely that the text on these sites is written in layman's terms, and the information is usually presented in a way that helps the audience to understand the topic. Therefore, students might find this type of source easy to understand and highly useful.

Articles from newspapers and magazine sites were the second- and third-most frequently identified sources of useful information (average ranking of 9.89/20 and 9.99/20, respectively; see Table 2). Many students viewed these sources to be useful because they found them to be interesting. Similarly, students assessed articles on online news and radio station sites as interesting, although they reported that these articles were less useful than those from newspaper and magazine sites. In the case of articles on broadcast channel sites, students believed that these articles were credible and easy to understand. Since most of these news articles also included video clips, students seemed to trust the given information more than they did information from other sources. The most frequently identified reason that students found information from organizational websites to be useful was the comprehensiveness of the source, as some sources in this category included technical reports with very detailed information regarding oil price changes.

Some students believed that scholarly journal articles were useful because they provided comprehensive information, while others thought scholarly journal articles were not very useful because many articles were somewhat outdated. Additionally, students responded that Wikipedia and online encyclopaedias were useful because they

were easy to find, but students were aware that the information on such sources could be limited and unreliable. Meanwhile, students felt that personal blogs or websites were less useful (average ranking of 12.35/20; see Table 2) but liked their interesting point of views. Lastly, social question-and-answer services were identified as the least useful sources (average ranking of 14/20; see Table 2) mainly because students believed that the information featured in these sources is often unreliable.

Which criteria do students apply to determine the usefulness of an online information source?

Some students reported that all 20 sources they found were useful, while others found only some sources to be useful. In general, however, sources ranked in the top five were identified as being useful, and sources ranked in the bottom five were identified as not being useful. Therefore, we analysed the frequently used reasons that the top five and the bottom five sources were identified as being useful or not being useful by each of the 65 students to examine the decisive and critical factors that students used to determine the degree to which an online information source is useful for learning.

Most students identified only one primary reason for determining whether a source was useful or not, but others provided more than one reason for some sources. Mostly, multiple reasons were given in the same category. For example, a student considered a source to be useful because it was both accessible and interesting, qualities that were both in the category of 'useful reasons'. However, some students would identify a useful source but point out its negative aspects. For example, a source was ranked highly because it provided comprehensive information despite being boring. We included and analysed all of the reasons identified by students.

As shown in Table 3, the most frequently identified reason that the top five sources were considered to be useful was comprehensiveness (27.69%), followed by how easy to understand the source is (21.54%) and students' level of interest in the source (18.15%). Credibility (16.31%), how up-to-date the source is (15.38%), and accessibility (13.54%) were not viewed as important. These results suggest that students find a source to be highly useful when it provides broad and detailed information and is written at an appropriate reading level for them or provides them with interesting content.

Table 3
Reasons for the top five and the bottom five ranked resources being useful, or not useful (n = 325 each)

		# of reasons for the top five resources	As % of total top five resources	# of reasons for the bottom five resources	As % of total bottom five resources
Reasons for being	Accessible	44	13.54%	13	4.00%
	Comprehensive	90	27.69%	18	5.54%
	Credible	53	16.31%	19	5.85%

useful	Easy to understand	70	21.54%	14	4.31%
	Organized	55	16.92%	22	6.77%
	Interesting	59	18.15%	20	6.15%
	Updated	50	15.38%	15	4.62%
Reasons for not being useful	Inaccessible	3	0.92%	22	6.77%
	Limited	12	3.69%	68	20.92%
	Unreliable	1	0.31%	26	8.00%
	Difficult to understand	3	0.92%	42	12.92%
	Disorganized	3	0.92%	25	7.69%
	Boring	4	1.23%	56	17.23%
	Outdated	4	1.23%	33	10.15%

According to Tsai et al. (2012), when students search for course-related information, they focus on finding a good-enough answer rather than on critically evaluating information or seeking a complete understanding of the topic. They invest little time and effort in reviewing information on their own. Instead, they rely on search engine descriptions, check the search results instantaneously without thoughtful consideration, and end searches when an acceptable result is acquired (Bloom & Deyrup, 2015; Thomas, 2004). When asked to evaluate online information, students do so cursorily not reflectively and deliberately (Julien & Barker, 2009). They rely heavily on Google (Connaway, White, Lanclos, & Le Cornu, 2013; Head & Eisenberg, 2009; Kolowich, 2011) and often consider rankings in search-engine results as recommendations of quality and credibility (Asher, Duke, & Wilson, 2013; Taylor & Dalal, 2014). As indicated in prior research, students often behave as 'information consumers', preferring convenience and ease of use (Becker, 2009) over credibility (Joo & Choi, 2015).

In the case of the five bottom-ranked sources, limited details of information (20.92%) was the most frequently identified reason for the ranking a source as not useful (Table 3). In this study, the most frequently identified reason that articles from broadcast channels, magazines, newspapers, or online news sites were not considered useful was the limited scope of the information provided by the articles. Students recognized that short news articles provide fragmentary information with few details that they were looking for. Usually, news articles on such sites deliver continuously updated information piece by piece, so students would need to read several pieces in order to understand the issue of interest. For this reason, this type of online information source may be useful for a long-term class project that requires students to stay current with frequently updated information over a certain period time, but this type of source may not be as useful for a short-term assignment.

Students also evaluated sources as not being useful when the sources were boring (17.23%) or difficult to understand (12.92%). Students seemed to find a source to be boring when it was written in an overly simplistic or general manner. When a source was relatively long—approximately more than 3,000 words—the source was considered

boring, too. Furthermore, when a source required a substantial amount of background knowledge, they found it difficult to understand. For example, in this study, students identified online information sources requiring prior understanding of the relationships among countries or each country's position regarding oil price, production, export, and import to be difficult to understand. Reports written by organizations like the World Bank or International Energy Agency were also difficult sources for students because of their lack of prior knowledge.

Outdated and unreliable sources were found not to be useful by approximately 10 and eight percent of the students, respectively. Online information sources identified being outdated were those published more than five to six years ago and those that did not offer information about the current situation. Online information sources identified as unreliable were mostly those in Wikipedia and social question-and-answer service sites. Students took a critical stance toward these sources because they believed that Wikipedia, personal blogs/websites, Twitter, and social question-and-answer websites were for sharing personal opinions rather than factual information, which is not always the case. This suggests that students' evaluations were based primarily on surface features rather than the actual content of the information they found in these sources. These findings are consistent with the prior research that indicates that students have difficulty in evaluating online information and overall do not hold a critical attitude towards online sources (Brand-Gruwel, Wopereis, & Vermetten, 2005; Flanagin & Metzge, 2010).

Disorganization (7.69%) and inaccessibility (6.77%) were also factors that reduced students' usefulness rankings for online information sources, although these were not as significant as the factors discussed above. There were several cases in which students considered online information sources to be inaccessible, including (1) when students had to sign up to read an entire article; (2) when students needed to scroll down to the bottom of a page or click several times to complete a search in order to, for instance, read an article they found on Twitter; and (3) when the sources were only accessible through a library network.

Improving Students' Information-Literacy Skills in Geography

Training for finding and using reliable online information sources is important for helping students become critical users of online sources. The results of this study indicate that students care more about the amount and the coverage of information featured in the sources rather than their quality, accuracy, and reliability. It might be intuitive to think that personal blogs or websites and social question and answer services contain information that is subjective. However, it is also true that information provided by other media such as magazines and broadcast channel sites could be inaccurate. Scholars have emphasized the necessity and significance of information-literacy skills for undergraduate students. Nonetheless, many instructors assume that students are already proficient information users, so they overlook the importance of information-literacy training for their students (Currie et al., 2010). Information-literacy training that focuses on developing students' critical analysis of such online sources would be worthwhile.

Many scholars have recommended the integration of information-literacy training into course curriculum as an effective and efficient way to improve students' information-literacy skills (Bruce, 2004; Bruce & Chesterton, 2002; Currie et al., 2010). Based on the results of this study, we propose several ways of improving students' information-literacy skills in geography courses. First, students need training to understand characteristics of each online information source types and their different angles of assembling and disassembling information. The students who participated in this study evaluated information from news media positively. Particularly, students tended to trust information from those sites more than they did information from other types of sources. However, news media often frame and deliver information based on their own perspectives and viewpoints, so some of their information may be biased (Entman, 2007). Additionally, online information provided by organizations may have different opinions and attitudes regarding an issue, depending on their positions or organization types (i.e., governmental, for-profit, or non-profit organizations). Therefore, students should accept information critically and use it selectively. It would be helpful for students if instructors explain the relevant background information and the circumstances of information construction and communication before assigning any assignments or tests involving online information.

As expected, the percentages of scholarly journal articles students used were relatively low in this study, whereas previous research indicates that most instructors wish that students would use them as resources for course assignments (Tomaiuolo, 2005). Often, university libraries offer sessions for students about how to access online article databases and search for journal articles, but not many students actually use these sessions; students prefer search engines to online article databases (Lee, Paik, & Joo, 2012; Tomaiuolo, 2005). The scholarly journal articles selected in this study were mostly uploaded articles on certain webpages, and it seems that those articles were found using search engines like Google rather than a library website. To encourage students to use journal articles for their coursework, it is important to show students how to search for them frequently in class. Since some of the journal articles are difficult to understand for undergraduate students, suggesting a list of journals that is appropriate for them may be helpful.

Furthermore, we found that students considered lengthy sources or those requiring background knowledge not to be useful because they were boring or difficult to understand. Consequently, students seemed to avoid reading such sources and preferred reading simple, easy-to-understand, short, online information sources. However, students often need to search for new information and acquire knowledge from detailed and professionally written online sources. Therefore, reading such sources as homework assignments or in-class activities would be helpful. After reading, understanding, and analysing content together in class would be a useful practice for students. For sources that require prior knowledge, we recommend providing additional materials for students.

Finally, for the successful integration of information-literacy training and course curriculum, a strong partnership between instructors and librarians is desirable (Bruce,

2004; Currie et al., 2010; McDowell, 2002; Weiler, 2005). Instructors are subject-matter experts, not necessarily experts about information literacy, but university librarians are trained in information literacy and can provide useful resources for students. Since both groups have different perspectives, experiences, and knowledge, a complementary collaboration could improve curriculum design and development to enhance students' understanding of content knowledge to become autonomous information consumers and self-motivated learners.

Conclusions and Recommendations

The rapid expansion of online information sources and accessibility to the internet has changed modes of teaching and learning in higher education. Prior studies have proved that undergraduate students prefer to use online information sources and frequently or exclusively use them for their academic tasks. This study aimed to identify their online information source selection behaviour in an actual course setting by examining the types of online information sources frequently selected, those considered to be useful or not to be useful, and the characteristics that students identify when judging a source to be useful or not to be useful for their learning.

By analysing responses from 65 students to an online information source searching assignment about changes in oil prices, it is shown that students used articles published on online news sites more frequently than any other sources. Among the various types of online information sources, students rated sources from instructional sites as the most useful and social question-and-answer services as the least useful ones. The results of this study show that students are aware of some criteria for considering online information sources to be appropriate as educational materials. More specifically, students understood that personal opinions would not be useful sources, as they evaluated social question-and-answer services and personal blogs or websites relatively lower than other types of online information sources. Students apply several criteria to determine the usefulness of online information sources. The most significantly considered factor for useful sources was comprehensiveness. Students considered a source as not being useful when it contained only limited information. That is, it is most important to students that a source should provide sufficient and comprehensive information about a topic.

Overall, this study achieved its goal, but there is room for improvement. Because of a limited number of the participants, and because of the nature of the topic assigned for searching for online information sources in this study, the findings should be generalized with caution. Students were asked only to select, not explain, factors that influenced whether they considered a source to be useful or not to be useful, so the rationales behind their decision-making processes were not investigated. For example, when students chose credibility as a reason for usefulness, the specific reason for that choice was unknown: Was it because of any supporting materials such as statistics, photos, and charts, or did students look at the source's references? Allowing students to verbalize their decision-making process through a focus group or individual interviews may be an effective approach to answer these questions in future studies. Additionally, changes in students' online search strategies and behavioural patterns after the

implementation of the recommended activities and training should be examined to improve students' information-literacy skills in world geography courses.

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