Information Needs and Information Seeking Patterns of Secondary School Geography Teachers to Implement National School Curriculum

Chundu Zangmo Tamang[1], Tashi[2], Lekh Raj Ghalley[3]

[1] cztamang@education.gov.bt
Ministry of Education
(Bhutan)

[2] tashi.sce@rub.edu.bt
Royal University of Bhutan,
Samtse College of Education
(Bhutan)

[3] lekrajghalley@education.gov.bt
Ministry of Education
(Bhutan)

ABSTRACT: *This study aims to explore the information needs and information-seeking patterns of secondary school geography teachers in Bhutan. The study discussed availability, accessibility, sufficiency of information, and barriers to teachers' information-seeking as the core themes of the study. This study was carried out by means of a survey collected from a total of 191 geography teachers in the whole country and two focus group discussions consisting of 5 members each. The quantitative data were analyzed using SPSS, while the qualitative data were analyzed using thematic method analysis. The results of the study indicated that the information needs of teachers are mostly related to teaching content, teaching resources, technology, and student's learning needs. The investigation of the information resources available/accessible to fulfill the indicated information needs revealed that teachers are heavily reliant on online information sources. One of the major findings indicated in the study was a lack of research community in schools and a lack of information literacy among teachers. In the twenty-first century, education has to fulfill the demands of transmitting a growing amount of knowledge in an appropriate way and to be lifelong learners, continually aspiring to learn and teach. Therefore, it is apparent that educators must be aware of the changing demands in teaching and learning. The results of this research may be useful for the educational authorities to develop appropriate policies that promote teachers' professional development competency and redevelop strategies to replace the inadequacy of information to fulfill curriculum demands.*

KEYWORDS: **Information, Information needs, Information Seeking Pattern, Accessibility, Availability, Sufficiency, and Information barriers.**

Received 26/07/2023 Revised manuscript received 29/08/2023 Published 30/09/2023.

1. Introduction

The information needs and information-seeking patterns of teachers play a key role in effective instructional planning and implementation. In the Bhutanese context, one of the common and widespread challenges teachers are currently faced with as a result of the introduction of the New School Curriculum (NSC) is the unavailability of the relevant information required for effective implementation of the curriculum. As a result, it has been a challenge for teachers to adapt to the newer ways of information-seeking. The problem is further exacerbated due to the nature of geography as a discipline that studies a wide range of phenomena, which are mostly outcomes of interactions between physical and human processes. Accordingly, geography teachers have to deal on a daily basis with vast libraries of current textual information, numerical data, and graphics, among others, all of which need to be constantly updated and experienced from a range of perspectives. Globally, the challenges associated with teachers' information needs and information seeking are studied. For example, Bisto (2011) pointed out the lack of time, inadequate library facilities, unavailability and inaccessibility of information, and inability to find up-to-date information as difficulties in finding information. Similarly, Snyman and Heyns (2004) also pointed to a heavy workload as one of the barriers to information seeking. Information-seeking behavior is highly associated with teachers as teachers' everyday teaching activities encompass searching

information, teaching resources, updating information, lesson planning, and preparation. Thus, it is deemed important to understand teachers' information needs, their information-seeking behavior, and the challenges they face while searching for information for the effective implementation of the curriculum. Information needs and information-seeking patterns of teachers have been sufficiently studied in other countries (Shehryar et al., 2021; Servais, 2012; Bisto, 2011; Vega & Punte, 2007). Although it is well known that Bhutanese teachers face similar problems, no study has been conducted on teachers' information needs and search patterns in Bhutan. Therefore, this research aims to examine the types of information needs of geography teachers, the patterns they follow for searching for information, and the barriers they encounter in searching for information.

2. Literature review

In this contemporary world, information has become an integral part of learning and increased the flexibility and accessibility of education. Depending on the disciplines being studied and the context in which it is being applied, information has a variety of underlying meanings and perspectives (Zhang & Benjamin, 2007). For instance, researchers who studied computer science described it as the output of an information system's input of raw and collected facts of data information (Boland, 1985). Similarly, the Bhutan Media and Impact Study [BMIS] (2013) defined information (whether in its original form or otherwise) that is in the form of a document, a signature, a seal, data, text, images, sound, or speech is considered to be information. Thus, the study considered information as any form of information used by teachers for teaching purposes.

Information needs are indications of a knowledge gap that needs to be satisfied. Wilson (2000) defined information need as a gap in knowledge caused by a lack of information. In addition, studies by Anderson (2006) and Ikoja-Odongo and Mostert (2006) affirmed that uncertainty is linked to information needs that trigger information seeking. Similarly, Case (2007) described "information need" as the realization that one's current knowledge is insufficient to achieve a particular goal. Although there are numerous definitions of information needs, most studies have described information needs as gaps in the knowledge of an individual that causes one to investigate information for further understanding and clarification. Borrowing the ideas from the above literature, this study considered information needs as the need for information due to inadequacy of information in various areas of teaching, specifically related to the content, lesson planning, teaching resources, assessment, instructional strategies, student learning, student motivation, classroom management, technology use in classroom and research.

Bisto (2011) conducted a similar study on geography teachers at the University of Pretoria. The study revealed that teachers needed information on content, teaching methods, classroom management, learners' assessment, education policies, syllabus, school performance, and social problems of adolescence. Khan and Shafique (2011) also looked at the information needs and habits of Bahawalpur College faculty. The outcome demonstrated that the majority of faculty members looked for information to meet their needs for lecture preparation, to enhance their personal competencies, and to keep themselves updated. Furthermore, Lan and Chang (2002) studied the information behavior of biology teachers in junior high schools in Taiwan. They found that the biology teachers' pedagogical knowledge played an important role in their processing of information. Furthermore, those biology teachers' information needs included information pertaining to students, subject matter, and pedagogical content, among others. The most identified areas for information need in the past studies are content, teaching strategies, classroom management and learner assessment, lesson preparation, keeping up to date with current affairs, publishing a book asserted that teachers are fundamentally concerned with subject knowledge and the curriculum (Shehryar et al. 2021: Tahira & Ameen, 2016: Servais, 2012: Bisto, 2011). Mardis (2009) mentioned

that the literature surrounding teachers' development suggests that teachers have very specific information needs relating to mastering the curriculum content and the behavioral structure of their classrooms for a diverse range of learners. Vega and Puente (2010) indicated that teachers not only require sources of information on the curricular areas they teach or on pedagogy, didactics, and information technology but also on the issues that students face.

However, the information-seeking pattern is determined by the availability of information sources (Bisto, 2011). According to Adigun et al. (2013), the University of Zaria found that the most accessible sources of information for faculty members were libraries, reference books, professional meetings, and dissertations or theses, while others, such as news/ magazines (periodicals), printed abstracts and indexes, manuscripts, and other primary source documents as well as printed journals. Likewise, Vega and Punte (2007) revealed that 53.8% and 46% of the teachers used the library and Internet in the school for teaching and learning, respectively. This showed that teachers have access to libraries and electronic media via the Internet.

The past literature also indicated that teachers primarily use Google, followed by YouTube, to search for information (Servais, 2012; Bisto, 2011; Xie & Joo, 2010; Rafiq, 2010). The most popular search engines, according to Servias (2012), were Google (89.5%), Yahoo (5.3%), and Bing (5.2%). Likewise, YouTube is the second most visited search engine in the world (Ertemel & Ammoura, 2021). These search engines are highly preferred because of their usability, speed of access, quality, and quantity of information retrieved, as well as their ability to retrieve information resources for research projects, term papers, learning more about a topic, course assignments, and seminar presentations (Ertemel & Ammoura, 2021). According to Carlson and Reidy (2004), articles and handouts downloaded from Google provide more recent information. Therefore, these search engines are gaining popularity and are highly preferred among users.

In India, teachers mostly used libraries, online newsgroups, workshops, and seminar reports, consultation with colleagues, friends and family members, and subject experts for information (Kundu, 2015). A similar study by Shehzad and Khan (2015) in Pakistan indicated that teachers preferred to use online resources and consult experts for information related to teaching. Most of the teachers preferred to use library materials and personal collections as formal sources of information (Khan, 2011). A study by Bisto and Fourie (2014) in South Africa indicated that teachers often used books, followed by personal knowledge and experience, teachers at school, reference books, and the school library. In China, Xie and Joo (2010) indicated two dominant sources in use, with more than 70% indicating library and internet sources. These revealed that teachers' use of the Internet for learning and teaching has been steadily rising.

On the contrary, teachers faced innumerable challenges in seeking information. Bisto (2012) identified difficulties that prospective geography teachers had while seeking information for teaching. The difficulties encountered include information available, not adequately addressing the syllabus, inability to find relevant information easily, often outdated information, inadequate time, difficulties to interpret and use information for lesson preparation and lack of information sources. The study revealed that outdated information and inadequate time were the most frequently experienced hindrances. Likewise, the lack of computer labs, unstable power supply, inadequate ICT infrastructure and e-databases, and the lack of information-searching techniques among educators also affect the information-seeking behavior of teachers and students (Nkebukwa, 2019). In Pakistan, Shehryar et al. (2021) identified the lack of adequate computers and unstable power, poor internet connectivity, a lack of furniture, and outdated resources in libraries were the main factors that hinder the in. The study also revealed incompetency and low qualifications of library staff who failed to seek library assistance and information enhancement strategies in the schools. In the Bhutanese context, Karma (2021) also pointed out that the difficulties faced by Bhutanese teachers in finding context-based information are poor

internet connectivity and resource availability in the school library. Therefore, it is imperative to explore the information needs, seeking patterns, and other hindrances among geography teachers across the country.

3. Methodology

The mixed method approach was used for this study. For the investigation, a sequential explanatory design was used. Survey questionnaires were used to collect quantitative data, while interviews were employed to acquire qualitative data. The findings from both quantitative and qualitative data were evaluated to provide further insights and conversations on the findings.

3.1. Study area

The study was conducted in the secondary schools of Bhutan. The country was divided into four regions: Western region, Central-western region, Central-Western region, and Eastern region, as depicted in Fig 1.

3.2. Sampling technique and sample size

This research includes teachers teaching geography subjects from grades IX to XII; a stratified random sampling was chosen as the sampling method. Stratified sampling is a probability sampling technique in which the total population is divided into homogenous groups (strata) to complete the sampling process. Each stratum was formed based on its location. Random samples were then selected from each stratum to evaluate data from different strata. It allows researchers to quickly obtain a sample population that best represents the entire population being studied (Creswell, 2013). Therefore, this sampling technique was chosen for this study.

There are 368 teachers teaching geography subject in the country, and the sample size of the study was calculated using the Taro Yamane formula with a 95% confidence level (Yamane, 1967, p.886). After calculating the sample size by substituting the numbers into the Yamane formula, the number of the sample was 191.

Fig 1. Study area

Table 1. Survey participants

Region and Dzongkhags	Male	Female	Total
Western Region (Thimphu, Chhukha, Samtse, Paro, Haa)	39	38	77
Central-West Region (Wangdue, Punakha, Dagana, Gasa)	16	20	36
Central-Eastern Region (Sarpang, Tsurang, Bumthang, Zhemgang, Trongsa)	13	21	34
Eastern Region (S/Jongkhar, Mongar, Trashigang, Trashiyangtse, Pemagatshel, Lungtse)	22	22	44
Total	90	101	191

Table 1 presents the number of participants who participated from different regions for this study.

The Focus Group Discussions (FGDs) were held with two groups of geography teachers, each group consisting of 5 members. The participants were selected using a purposive sampling technique.

3.3. Sampling tools

Quantitative data were collected through survey questionnaires from nationwide geography teachers. Owing to the time constraint, the researcher rolled out the online survey questionnaires via various social media platforms to reach the maximum number of participants across the country. The survey questionnaire was modified by Bisto (2011) and Servais (2012) to study the information needs and information-seeking patterns of secondary school geography teachers. The survey consists of four sections: (1) demographic information, (2) information needs, (3) Information-seeking patterns, and (4) suggestions from teachers to improve information-seeking experience. Similarly, qualitative data was collected through Focus Group Discussion (FGD). FGD interview questions consist of five sections: (1) information needs, (2) information-seeking patterns, (3) information-seeking style, (4) hindrances to information-seeking, and (5) suggestions. The interview was digitally recorded to make sure that nothing being contributed was missed.

3.4. Participants' demographic profile

A total of 191 geography teachers were surveyed, where 62.3% (119 respondents) represented males, 37.2% (71 respondents) represented females, and 0.5% (1 respondent) represented others. The highest number of respondents 48.2%, was from the schools located in semi-urban areas of Bhutan, followed by 24.6% and 27.2% from urban and rural areas, respectively. The majority of participants were from the age group of 31-35 years. The least of the respondents included respondents from the age group of 20-25 years. Similarly, the qualification of the participants ranges from BEd (Bachelor in Education) graduates to masters and PhD.

3.4. Data analysis

Quantitative data from survey questionnaires were entered into a database, and statistical analysis was performed using SPSS version 22. Simple descriptive statistics such as frequencies, percentages, and cross-tabulations were produced using this software. The qualitative data was analyzed thematically to understand the information needs and seeking patterns of geography teachers in the schools.

4. Results and discussion

This chapter unveils the principal findings of the research study through the application of appropriate quantitative and qualitative data analysis techniques. The required data were collected via survey questionnaires and Focus Group Discussions and subsequently analyzed and presented in tables and figures. The

Table 2. Teachers' information needs

Information related to:	Participants (%)					
	N	1	2	3	4	5
1. Content.	191	.5	3.7	16.8	32.5	46.6
2. Lesson planning.	191	4.2	9.4	30.9	32.5	23
3. Teaching resources	191	0	5.8	15.2	33	46.1
4. Assessment of students' learning.	191	.5	7.9	28.3	33	30.4
5. Instructional strategies.	191	1	8.4	25.1	35.6	29.8
6. Student learning.	191	0	4.2	21.5	33	41.4
7. Student motivation.	191	.5	7.9	23	34	34
8. Classroom management	191	2.1	10.5	32.5	30.4	24.6
9. Technology use in the classroom (e.g., computers, software programs)	191	1	5.2	22.5	27.7	43.5
10. Research	191	4.2	22	24.6	26.7	22.5

Level: Not at all: 1, To a small extent: 2, To a moderate extent: 3, To a fairly great extent:4, To a great extent:5.

interpretations are grounded in alignment with the research objectives, which constitute integral facets of the research study. In addressing the research objectives, five overarching themes emerged: 1) Teachers' information needs, 2) Availability and Accessibility of Information Sources, 3) Sufficiency of information, 4) Utilization of information sources, and 5) Barriers to seeking information.

4.1. Teachers' information needs

The findings show that secondary school geography teachers have several informational needs. The specific areas of information needs are presented in Table 2.

Teachers indicated information needs *'to a great extent'* for content (46.6%), teaching resources (46.1%), Technology (43.5%), and students' learning (41.4%). Contrarily, only 22.5 %, 23%, and 24.6 % reported information needs '*to a great extent'* for research, lesson planning, and classroom management, respectively. The analysis of open-ended survey questions revealed that most of the teachers sought information on pedagogies that enable students to apply knowledge in real-world situations to meet the demands of the 21st-century job market. The information on classroom management, which helps teachers to improve students' discipline, was another area of teachers' information need.

Similar to quantitative findings, FDG participants expressed the need for information in the following areas - content, resources, Technology, and student learning.

Content: "*Geography is an interdisciplinary subject. Its contents are drawn from a number of other disciplines. Moreover, the content that students study in schools is periodically updated through the revision of the syllabus. Recently, QGIS (Quantum Geographical Information Systems) was introduced in classes XI to XII. So, we seek information on challenging topics like QGIS, time calculation, and map work".* FGD 2

Resources*: "I frequently search for teaching resources from a variety of sources. As a teacher, it is very important to use a wide range of learning and teaching resources. Likewise, teaching resources provide learning experiences for the learners. Moreover, they facilitate interaction between students and teachers during the teaching and learning processes".* FGD 1.

Technology: "*TechnologyTechnology is used in a variety of ways during teaching and learning. The way that students learn today compared to how we learn has completely*

changed. Personalized digital learning has replaced the traditional chalk-and-talk classroom settings. A teacher must, therefore, use a variety of technologies to promote student participation and facilitate learning. As a result, we would like to research the best technologies for classrooms". FGD 1.

Student learning: *'BPST (Bhutan Professional Standard for Teachers) requires teachers to know each individual student they teach. We have diverse learners in our classrooms who have different learning styles. Teachers search for information related to student learning to a large extent in order to motivate and inspire students to learn*. FGD 2

On the other hand, information related to research was sought the least by the teachers due to the absence of research specialists in the school and a lack of research knowledge. Similarly, information related to lesson planning and classroom management was sought the least because schools have a prescribed format for lesson plans, as evidenced in FGD 2: "*We hardly seek information related to lesson planning. Almost every school has its own uniform format for lesson planning. Moreover, planning lessons largely depends on the individual school setting and the teacher's personal experience of learners and the classroom*".

The majority of geography teachers in this study sought maximum information related to the content and teaching resources rather than research activities in the school. In Pakistan, teachers needed information for preparing lectures, for academic purposes, for motivating students, and to keep up to date with current affairs, among others (Shehryar et al., 2021). A similar study by Tahira and Ameen (2016) in India also pointed out that the teachers needed information for various tasks such as preparing their lectures, guiding the students in their research work, updating themselves, and publishing a paper or book. Servais (2012) reported that Canadian teachers needed information related to curriculum, student learning, student motivation, lesson planning, teaching strategies, teaching resources, assessment, classroom management, technology use in the classroom, student exceptionalities, communicating with parents, a particular issue affecting a school and professional development. In Africa, teachers' information needs indicate information related to content, teaching methods, classroom management, learners' assessment, education policies, syllabus, school performance, and social problems of adolescence (Bisto, 2011). Considering the information needs of teachers in past studies, the information needs for teachers are voluminous, from delivery of content to students' motivation, professional development, Technology, and research.

4.2. Availability and Accessibility of Information Sources

Most teachers need information to prepare

Table 3. Accessibility of information sources

	Participants (%)			
Information Sources:	**1**	**2**	**3**	**4**
1. Library	72.3	18.8	6.8	2.1
2. Reference books	31.4	45.5	18.8	4.2
3. Internet/electronic information	55.5	30.4	11	3.1
4. Printed/electronic journals	20.9	44	26.2	8.9
5. Media (TV, radio, newspapers, etc.)	46.6	33	16.8	3.7
6. A blog, chat room, or online discussion group	29.3	42.4	19.4	8.9
7. Conferences/workshop reports	15.2	50.8	25.7	8.4
8. Government/ministry documents	24.1	45.5	22	8.4

Level: 1: Accessible, 2: Somewhat Accessible, 3: Somewhat Inaccessible, 4: Inaccessible

lessons, find appropriate teaching resources, and understand student learning and technology use. Accordingly, teachers rated the accessibility of information sources from 1 to 4, with 1 suggesting "Accessible" and 4 suggesting "Inaccessible".

The analysis of the data in Table 3 revealed that the library (72.3%), the Internet or electronic databases (55.5%), and the media (46.6%) are the three most easily accessible sources of information. Other information sources like reference books, printed or online journals, blogs or chat rooms, online discussion groups, reports from conferences or workshops, and government or ministry documents were accessible to some extent.

The results of the interviews also supported the idea that they are the most easily accessible information source. FGDs revealed that teachers frequently used the Internet, electronic databases, and media to find information, in addition to libraries. The need for printed books has been replaced by the accessibility and availability of digital tools and internet connectivity. However, interviewees also expressed that poor internet connectivity at their workplace and residence limited their access to the Internet or electronic databases and media.

Examining the findings from FGDs, teachers indicated the least accessibility to reference books, printed or electronic journals, conferences or workshop reports, and government or ministry documents. The lack of sources was cited as the most likely cause of the low accessibility of these sources.

According to FGD 1, conferences or workshop reports are mostly unavailable to them. The interviewees reported going to two or three workshops. They mentioned that workshops are great opportunities for professional development and interaction with other professionals from outside the school. However, only a few teachers received opportunities to attend workshops. A similar view can be seen in FGD2's assertion:

"PDs are conducted once every two or three weeks or even longer in schools. However, school-based improvement plans, or SBIPs, primarily concentrate on rules, behavior at school, the roles and responsibilities of teachers, and many other aspects of school improvement plans. Consequently, fewer PDs are conducted on teaching and learning processes, particularly those pertaining to specific disciplines".

Similarly, interviewees are of poor opinion about the accessibility of government or ministry documents. According to FGDs, government or ministry documents are at least useful for teaching purposes. Moreover, most of these documents are not accessible to the public.

The research findings imply that libraries are the most accessible source of information, followed by the Internet or electronic information and information from the media. Similar research conducted by Ganiyu et al. (2010) at the University of Zaria found that the most accessible sources of information for faculty members were libraries, reference books, professional meetings, and dissertations or theses, while others such as news/magazines (periodicals), printed abstracts and indexes, manuscripts, and other primary source documents as well as printed journals. Likewise, Vega and Puente (2007) revealed that 53.8% and 46% of the teachers used the library and Internet in the school for teaching and learning, respectively. This showed that teachers have access to libraries and electronic media via the Internet.

However, the information's availability also had an impact on how easily it could be accessed. According to Slater (1963), Allen (1968), and Rosenberg (1967), information sources that are accessible and require the least effort to access are used more often than those that are difficult to access. For instance, Ntui et al. (2015) reported that the inadequate availability of reference books, newspapers, and magazines resulted in a decrease in the number of teachers visiting libraries. Additionally, Nwokedi and Adah's 2009 study found that rural schools have less access to information than towns. This indicates that different locations have different availability and accessibility of information sources.

4.3. Sufficiency of information

In order to find information, it is crucial that it is available and easily accessible. Table 4 outlines the sufficiency of information provided by the information sources.

Table 4. Sufficiency of information provided by information sources

Information Sources:	Participants (%)	
	1	2
1. Library	35.1	64.9
2. Reference books	40.3	59.7
3. Internet/electronic information	79.6	20.4
4. Printed/electronic journals	36.1	63.9
5. Media (TV, radio, newspapers, etc.)	39.3	60.7
6. A blog, chat room, or online discussion group	45	55
7. Personal knowledge/experience	50.3	49.7
8. Teachers at the school	56	44
9. Personal friends/family/relatives	50.3	49.7
10. Conferences/workshops report	45	55
11. Government/ministry documents	41.4	58.6
12. NNC (New Normal Curriculum) instructional guide	55	45

Level: 1: Information source provides sufficient information, 2: Information source does not provide sufficient information

Table 4 presents data outlines the sufficiency of the information provided by the different information sources; it is evident that 79.6% of the participants indicated that the Internet or electronic databases provided the highest sufficiency of information, followed by teachers at school (56%) and the NNC (New Normal Curriculum) instructional guide (55%). Moreover, 50.3% of participants reported that their personal experience and knowledge and personal friends, family, or relatives provided sufficient information compared to other sources of information. Comparatively, the Internet or electronic databases provided the most sufficient information. Furthermore, other sources of information, such as libraries, reference books, and printed or electronic journals, did not provide sufficient information.

The interview data also indicated similar findings. Both the FGDs indicated taking advantage of the availability of the Internet or electronic databases and teachers at school, as evidenced below:

"Compared to other information sources, the internet and electronic databases are more informative. Similarly, teachers at our school also give information". FGD 1

"You can find all the information you need on the Internet or in electronic databases. Online information is more thorough than all the other information sources we have access to. The Internet or electronic databases provide information in more detail, whether it be in the form of video, presentations, or simply written content". FGD 2

When asked about the use of personal knowledge and experience as a source of information, a great majority of the interviewees mentioned that they often used their knowledge and experience in the preparation of lessons. The respondents claimed that they used their knowledge and experience to find the information they needed, as evidenced by the following quote from FGD 2:

"Personal knowledge and experience play a crucial role in retrieving and sorting information. From our experiences and prior knowledge, we already know a lot about a subject when we seek information on it. Our experiences and knowledge, therefore, direct us to seek clarity because we are aware of our informational needs".

Interestingly, interview participants disagreed that the NNC IG (New Normal Curriculum Instructional Guide) provided sufficient information for teaching. They expressed that, unlike textbooks, they are not to be used for transmitting knowledge; instead, they are to be used for facilitating learning. Both the FGDs were of a poor opinion of the NNC IG, as evidenced by a comment from the FGDs:

"NNC IG is not a data repository like textbooks; it is a user manual for teachers. Instead, each topic includes links that take us to websites with related information and video resources. The data cited by the links, however, is not all trustworthy. Consequently, finding the appropriate information requires time". FGD 1

"The NNC IG is just a directive. I participated in the writer's workshop for the NNC IG. It is so frequently misinterpreted because it is a guide. The NNC instructional manual states that they are merely suggestive links. Therefore, it is not required that the teachers adhere to it as strictly as the Bible. Although suggestions for information and video sources are left up to the teachers, they are required to use NNC IG to refer to the syllabus that must be covered in lessons". FGD 2

The literature indicates that users may decide that the information will be sufficient to meet their needs after chasing and evaluating references and identifying content that is of interest and relevance to them (Bisto, 2011). Both the qualitative and quantitative findings of the present study indicated that internet/electronic information provides sufficient information to the teachers compared to other sources of information. Teachers explained that the Internet provides information in greater variety, details, and at different times while providing them the freedom to assess and select which information satisfies their needs. This agrees well with findings from Dilevko & Gottlieb (2002) that users seek information that has complete coverage, accuracy, and in-depth content. Wu et al. (2005) studied elementary school teachers' searching behavior for instructional resources on the Internet and how they integrate those resources into classroom teaching. The study found that the teacher's search is fulfilled when gathered information is current and accurate. According to Thilagavathi and Thirunavukkarasu (2015), most of the teachers were not satisfied with books in the library, and 71% were satisfied with databases and e-journals. This showed that

Table 5. Teacher's information source preference

Information Sources:	Participants (%)		
	1	2	3
1. Library	40.3	54.5	5.2
2. Reference books	45	51.3	3.7
3. Internet/electronic information	80.1	15.7	4.2
4. Printed/electronic journals	31.9	59.7	8.4
5. Media (TV, radio, newspapers, etc.)	42.4	51.3	6.3
6. A blog, chat room, or online discussion group	24.6	51.8	23.6
7. Personal knowledge/experience	65.4	31.9	2.6
8. Teachers at the school	53.9	43.5	2.5
9. Personal friends/family/relatives	41.9	50.8	7.3
10. Conferences/workshops reports	21.5	66	12.6
11. Government/ministry documents	27.7	60.2	12
12. NNC (New Normal Curriculum) instructional guide	61.3	18.8	1.6

Level: 1: Often, 2: Sometimes, 3: Never

teachers accessed their information via internet access in their workplace rather than a physical library hoarded in the school library.

4.4. Utilization of information sources

The suitability and accessibility of the information offered by an information source heavily influence the preference and use of that information source. Therefore, it is most likely that people will use particular information sources if they are available and offer sufficient information that is pertinent to them. Teachers were asked to rate the information sources that they used on a scale from 1 to 3, where 1 indicated "Often" and 3 indicated "Never" as depicted in Table 5

Table 5 shows that participants "often" consulted the Internet or electronic databases (80.1%), their own personal knowledge and experience (65.4%), the NNC IG (61.3%), and their teachers at school (53.9%).

The results of the FGDs provide strong support for the questionnaire's findings. The majority of interviewees reiterated that they used personal knowledge and experience, the Internet or electronic databases, and teachers in school. They made use of these resources because they were available and offered enough data. It's interesting to note that teachers frequently utilized NNC IG as well. Despite the fact that interviewees had disagreed with its sufficiency of information in the earlier section, it is extensively utilized because it is accessible as all copies of the instructional guides have been made available to the teachers at schools.

In the previous section, the library was indicated as the most accessible source of information. However, the findings on the sufficiency of the information provided by the library indicated insufficient. It is clearly indicated in this section that only 40% of participants utilized the library to seek information for teaching. This indicates that libraries are the most accessible source of information in schools. However, the lack of sufficient teachers' references, as discussed in the previous section, clearly explains the low utilization of libraries in Bhutan. The findings of the previous research (Kim & Sin, 2007; Lee et al., 2007; Liu & Yang, 2004; O'Reilly, 1982) indicated that accessibility, ease of use, comprehensive coverage, accurate/reliable results, and cost of sources are the factors that influence users' selection of information sources.

Studies carried out in this regard point out that teachers have preferred to use libraries, electronic sources, colleagues, friends, and experts, among a few others. In India, teachers mostly use libraries, online newsgroups, workshops, and seminar reports, consultation with colleagues, friends, and family members, and subject experts for information (Kundu, 2015). A similar study by Shehzad and Khan (2015) in Pakistan indicated that teachers preferred to use online resources and consult experts for information related to teaching. Most of the teachers preferred to use library materials and personal collections as formal sources of information (Khan, 2011). A study by Bisto and Fourie (2014) in South Africa indicated that teachers often used books, followed by personal knowledge and experience, teachers at school, reference books, and the school library. In China, Xie and Joo (2010) indicated two dominant sources in use, with more than 70% indicating library and internet sources.

Previous studies (Mahapatra, 2011; Perrault, 2009; Erdem, 2008; Kim, 2008; Borgman et al., 2005) revealed that teachers' use of the Internet for learning and teaching has been steadily rising. Since they offer thorough information, quick access to information, and ease of access to information, online resources are the most preferred information sources among teachers (Ray & Day, 2006). Accordingly, the ability to download or print the desired documents, the speed and ease with which articles can be sent to colleagues, and the ability to search through a large number of journal articles all influence teachers to choose the Internet as their top choice for information (Liew, 2000; Woodward et al., 1997). Therefore, this research suggests that the Internet is a highly reliable, comprehensive, and efficient source of information for teachers in the teaching and learning process.

4.5. Barriers to seeking information

According to survey results, 44% of respondents gave the statement, '*There is time constraint due to heavy workload*,' a *'Strongly*

Table 6. Teacher's information-seeking barriers

Barriers to Information Seeking:	Participants (%)				
	1	2	3	4	5
1. The information available does not adequately address the requirements of the syllabus.	24.6	47.1	17.3	9.4	1.6
2. The information available is too general.	18.8	48.2	18.8	12	2.1
3. I can't find the relevant information easily.	24.1	41.4	16.2	14.7	3.7
4. There is a time constraint due to the heavy workload.	44	31.4	16.2	6.8	1.6
5. Information is often outdated.	18.3	37.7	27.7	13.1	3.1
6. Accessing information is costly.	21.5	36.6	31.4	7.3	3.1
7. Information is not easy to interpret and use for teaching.	12	41.9	27.7	14.7	3.7
8. Information sources are not adequately accessible.	12	44	22.5	16.8	4.7
9. The internet connectivity hinders information seeking.	37.2	37.2	11	8.9	5.8
10. I have poor ICT literacy to explore information needs.	11	28.8	21.5	27.7	11
11. The school library has inadequate information required for teaching.	24.6	38.2	18.8	12	5.8

Level: 1: Strongly Agree, 2: Agree, 3: Neutral, 4: Disagree, 5: Strongly Disagree

Agree' rating. Similarly, 37.2% of participants indicated *'Strongly Agree'* for item 9: *"The internet connectivity hinders information seeking'*, followed by item 1: '*Information available is not adequately addressing the requirements of the syllabus'* (24.6%); item 11: *The school library has inadequate information required for teaching* (24.6%); item 3: *Can't find the relevant information easily* (24.1%); and item 6: *Accessing information is costly* (21.5%). Overall, the findings indicate that the most pertinent barrier to information seeking for teachers is the time constraints due to heavy workload.

The findings of the survey were supported by qualitative findings. The results of the FGDs showed that time management problems among teachers were frequently brought on by their extensive workloads. Teachers expressed that they face time constraints almost every day. They mentioned the heavy workload due to the high number of teaching periods as a result of the shortage of teachers. They faced difficulties accessing students' classwork, homework, and unit test papers on time. Moreover, aside from teaching, teachers also have to carry out other non-teaching activities, such as school beautification projects, which are carried out during holidays or non-teaching hours. Furthermore, teachers take on a variety of roles, such as those of a class teacher, housemaster, committee member, etc. Thus, they sought information mostly during their own time at home after classes or during weekends. As a result, teachers had limited time to research information for lesson preparation, as shown by the comment from FGDs:

"Due to our busy schedules, we struggle with time management almost daily. My school has only two geography teachers, and we have the highest number of periods in school. Each one of us would get 20 to 35 periods in a week. There are around 30 to 35 students per class, with five to six sections. We face difficulties assessing students. Besides teaching, I have other roles and responsibilities. I am a class teacher, housemaster and subject teacher. I am also a member of the disciplinary committee, the scout's association, and the coordinator of a club. At times, we also have to teach other subjects when there is a teacher shortage. During most of the school hours, I am engaged in performing different responsibilities. When I

reach home, I will be too tired to prepare for the next lesson". FGD 1

Teachers also cited a lack of internet connectivity as the second most common obstacle to finding information. FGDs reported having poor internet connectivity at work because so many people were depending on single-band wireless routers. Consequently, they searched for information using their personal data. The other schools with internet connectivity are fortunate, while some schools struggle with internet accessibility.

"We must first search for information in browsers before we can obtain it. Finding the appropriate information requires time. I search for information both at school and at home. For instance, downloading a relevant video takes a very long time. Poor and slow Wi-Fi connectivity is a problem at school. So, I download teaching resources using my personal data both at work and at home". FGD 1

Furthermore, interviewees expressed the lack of sufficient time and the high cost of data for accessing information. (Statement 6: *Accessing information is costly)* as evidenced*:*

"Internet connectivity deteriorates in the school because of the numerous users who rely on Wi-Fi. Therefore, we access information and download educational materials using our personal mobile data. I use between 25,975MB and 37,570MB of data volume per month. There are many schools in Bhutan that are having issues with poor internet connectivity, though it may not be the same for all". FGD 2.

Subsequently, interviewees expressed that the available information does not fully satisfy the requirements of the syllabus. Findings from the FGDs give credence to the anecdotal evidence below:

"The available information does not sufficiently address the syllabus's requirements. There is a wealth of information available to us online, but we must filter it to find what we need. The information we seek is occasionally specific, but more often, it is either irrelevant or too general." FGD 2.

Likewise, interviewees expressed difficulties finding relevant information. Furthermore, they reported that libraries have inadequate information for teaching. Interviewees expressed a lack of teachers' references in the library. Their main source of reference is reported to be Internet sources. However, interviewees also expressed information overload and an inability to find relevant information from online sources, especially in Bhutanese contexts.

Sufficient amounts of previous research have copiously discussed barriers to information seeking. The present study indicated time constraints due to heavy workload and internet connectivity as the greatest hindrances to seeking information. Previous studies have also cited similar findings. The recent studies by Okoli and Azubuike (2021) indicated the major factors that hindered the teachers from getting their needed information were the lack of relevant information in the school library, insufficient access to new technological facilities, and the lack of opportunities for professional development through seminars and workshops. Furthermore, according to Bisto and Fourie (2014), the two biggest obstacles were out-of-date knowledge and a lack of time. Similar issues were reported in Pakistan, including a lack of reference books, computers, and internet access, problems with out-of-date information and power fluctuations, a lack of furniture and books in the library, and a poor working environment (Shehryar et al., 2021). According to Hussain and Ahmad (2014), the most common obstacles faced in Arabia included a lack of access to information sources and a lack of time for information research.

According to Servais (2012), teachers encounter various difficulties while searching for information, such as a lack of awareness of searching information, searching costs, information overload, difficulties finding specific information, and lack of time to search for information. The study reported that many websites required an access or professional fee, making information access expensive.

Callinan (2005) noted a lack of time, slowness in downloading web-based resources, and a lack of awareness of different electronic databases. The study's findings also showed that it was difficult to find relevant information, lack of

internet search skills, and confusion caused by information overload.

5. Conclusions and recommendations

Findings indicated that the information needs of teachers are mostly related to teaching content, teaching resources, Technology, and students' learning needs. However, the information sought for research was indicated the least. The lack of a research community in schools is evidenced by the fact that teachers sought the lowest amount of research-related information. The scarcity of research practices in schools is an indication that schools lack research-based teaching and learning in classrooms. Research can play an important role in supporting teachers to identify and address issues in teaching and learning practices.

The study also found that teachers in Bhutan primarily rely on online information sources to meet their informational needs. The results, however, showed that teachers lacked information literacy when it came to selecting the right sources of information for their lessons or evaluating the authenticity, relevance, and significance of the information. While misinformation may mislead students, it may also have a detrimental impact on teaching. Thus, information literacy plays a paramount importance in evaluating and selecting information due to information overload in online sources.

Teachers mentioned a number of other sources of information, but they also mentioned issues with information accessibility, sufficiency, and use. According to the research, libraries were found to be the most easily accessible source of information. However, due to a lack of sufficient teacher resources in the school libraries, teachers make the utmost use of online resources such as web databases, websites, and search engines. The most common challenge teachers encountered was time constraints because of their extensive workload. It is shown that teachers also experienced other difficulties, such as the lack of internet connectivity, the difficulty in finding information that is relevant, particularly information that is contextual to the Bhutanese context, and the cost of information accessibility. All of these obstacles make it more difficult to find information that meets the requirements of the syllabus.

Based on these findings, it is highly recommended that the relevant stakeholders (Royal Education Council (REC) and the Ministry of Education (MOE) explore and implement appropriate interventions for improving information and library services to enhance the availability of information. It is also recommended that the relevant stakeholders dive further into the difficulties faced by teachers for the successful implementation of the curriculum. It is also imperative to improve their research capabilities and cultivate a research culture for Bhutanese teachers. Concerned authorities must investigate access to internet connectivity in different schools in the country. School management should look into creating a conducive working environment with good internet access for teachers. School authorities should also look into various possibilities of making other sources of information such as e-books, databases, newspapers, magazines, and internet access available in the library. MOE should investigate the accessibility of internet connectivity and availability of information sources across the schools in Bhutan. This may bring to light the implementation of textbookless curricula in schools. It is recommended for school librarians to investigate the availability, efficiency, and use of library resources for seeking possibilities of collaborations with national and international libraries to have greater access and aid to information.

References

Adigun, G. O., Olusegun Oke Library, Ladoke Akintola University of Technology, Kotso, J. A., Kolajo, F. S., College of Education, Akwanga, Nasarawa State, Nigeria, & Olusegun Oke Library, Ladoke Akintola University of Technology. (2013). Changing roles of academic and research libraries in scholarly information communication landscape: A case study of Ahmadu Bello University, Zaria, Nigeria. *Greener Journal of Social Sciences, 3*(3), 156–165.http://doi.org/10.15580/gjss.2013.3.021213446

Allen, T. J. (1968). Organizational aspects of information flow in technology. *Aslib Proceedings, 20*(11), 433–454. http://doi.org/10.1108/eb050169

Bhutan Media and Impact Study [BMIS] (2013), *Ministry of Information and Communications Royal Government of Bhutan*.

Bisto, C. F. (2012). An investigation of information seeking behavior of geography teachers for an information service intervention: the case of Lesotho. *Information Research*, *17*(4), 1–14.

Bitso, C. M. L. (2011). *The information needs and information-seeking patterns of secondary level geography teachers in Lesotho: implications for information service* (Doctoral dissertation, University of Pretoria).

Bitso, C., & Fourie, I. (2014). Information-seeking behavior of prospective geography teachers at the National University of Lesotho. *Information Research: An International Electronic Journal*, *19*(3), n3.http://informationr.net/ir/19-3/paper637.html

Boland, R. J. (1985). *10 Phenomenology: a preferred approach to research in information systems.* Elsevier Science Publishers.

Borgman, C. L., Smart, L. J., Millwood, K. A., Finley, J. R., Champeny, L., Gilliland, A. J., & Leazer, G. H. (2005). Comparing faculty information seeking in teaching and research: Implications for the design of digital libraries. *Journal of the American Society for Information Science and Technology*, *56*(6), 636-657. Buckland, M. K. (1975). Book availability and the library user.

Byström, K., & Hansen, P. (2005). Conceptual framework for tasks in information studies. *Journal of the American Society for Information Science and Technology*, *56*(10), 1050-1061.

Callinan, J. E. (2005). Information-seeking behavior of undergraduate biology students: A comparative analysis of first year and final year students in University College Dublin. *Library Review*.

Carlson, B., & Reidy, S. (2004). Effective access: Teachers' use of digital resources (research in progress). *OCLC Systems & Services: International digital library perspectives*.

Case, DO (2007) *Looking for Information: A survey of research on information seeking, needs and behavior.* Emerald Group Publishing.

Cohen, W. M., Nelson, R. R., & Walsh, J. P. (2002). Links and impacts: the influence of public research on industrial R&D. *Management Science*, *48*(1), 1-23.

Creswell, J. W. (2013). *Research Design (international student edition): Qualitative, quantitative, and mixed methods approaches* (4th ed). Sage publications.

de la Vega, A., & Puente, R. T. (2010). Availability and use of printed, audiovisual, and electronic information by high school teachers of communication and social sciences in public educational institutions in Peru. *Libri*, *60*(4). http://doi.org/10.1515/libr.2010.026

Dilevko, J., & Gottlieb, L. (2002). Print sources in an electronic age: a vital part of the research process for undergraduate students. *the Journal of Academic librarianship*, *28*(6), 381-392.

Erdem, A. R. (2006). Dünyadaki yükseköğretimin değişimi. Selçuk Üniversitesi Sosyal Bilimler *Enstitüsü Dergisi, 15* (3), 299–314.

Ertemel, A.V., & Ammoura, A. (2021). Is YouTube a Search Engine or a Social Network? Analyzing Evaluative Inconsistencies**.** *Business and Economics Research Journal 12*(4):871-881. DOI:10.20409/berj.2021.357

Foster, A. (2005). A nonlinear model of information-seeking behavior. *Journal of the American Society for Information Science and technology*Technology, *55*(3), 228-237.

Ganiyu, B. O., & Zubairu, I. K. (2010). Project cost prediction model using principal component regression for public building projects in Nigeria. *Journal of Building Performance ISSN*, *1*(1), 2010.

Hussain, G. A., & Ahmad, P. (2014). Information Seeking Behaviour of the Teachers and Students at College of Engineering, King Saud University, Riyadh: A study. *Asian Review of Social Sciences*, *3*(1), 45-54.

Ikoja-Odongo, R., & Mostert, J. (2006). Information seeking behavior: a conceptual framework. *South African Journal of Libraries and Information Science*, *72*(3), 145–158.

Karma, K. (2021). *Geography teachers' self-efficacy, beliefs and students' motivation for learning* [Unpublished masters dissertation]. Samtse College of Education.

Khan, S. A., & Shafique, F. (2011). Information needs and information-seeking behavior: A survey of college faculty at Bahawalpur. *Library philosophy and practice*, *16*.

Khan, S. A., & Shafique, F. (2011). Information needs and information-seeking behavior: A survey of college faculty at Bahawalpur. *Pakistan Journal of Library & Information Science, 12* (1), 1-6. https://digitalcommons.unl.edu/libphilprac/484

Kim, K. S., & Sin, S. C. J. (2008). Perception and selection of information sources by undergraduate students: Effects of avoidant style, confidence, and personal control in problem-solving. *The Journal of Academic Librarianship*, *33*(6), 655-665.

Komolafe-Opadeji, H. (2011). Use of Internet and electronic resources amongst postgraduate students of a Nigerian private university. *Information Technologist (The)*, *8*(1), 29-34.

Kundu, D. K. (2015). Nature of the Information Seeking Behaviour of Teachers Engaged in General Degree Colleges and Teachers' Training Colleges: A Critical Analysis. *Athens Journal of Education, 2*(3), 257–273.

Lee, J. Y., Han, S. H., & Joo, S. H. (2008). The Analysis of the Information Users' Needs and Information Seeking Behavior in the Field of Science and Technology. *Journal of the Korean Society for Information Management*, *25*(2), 127-141.

Liew, C. L., Foo, S., & Chennupati, K. R. (2000). A study of graduate student end-users' use and perception of electronic journals. Online Information Review, 24 (3), 302-315. doi: 10.1108/14684520010350650.

Liu, Z., & Yang, Z. Y. L. (2004). Factors influencing distance-education graduate students' use of information sources: A user study. *The Journal of Academic Librarianship*, *30*(1), 24-35.

Mahapatra, R. K., Swain, D. K., & Jena, K. L. (2011). Information seeking behavior of teachers of engineering colleges in the capital city of Odisha: a case study. *Pearl: A Journal of Library and Information Science*, *5*(3), 26-36.

Mardis, M. A. (2009). Viewing Michigan's digital future: Results of a survey of educators' use of digital video in the USA. *Learning, Media and Technology*, *34*(3), 243-257.

McKenzie, P. J. (2003). A model of information practices in accounts of everyday life

Nkebukwa, L. L. (2019). Assessing of information-seeking behaviour of academic staff in the emerging electronic information era: a case study of cbe and irdp in Tanzania. *Business Education Journal*, *6*(1). Nwokedi, V. C., & Adah, J. (2009). Information needs of post-primary school teachers in Jos, Plateau State, Nigeria. *Information Technologist (The)*, *6*(2).

Ntui, A. I., & Udah, A. E. (2015). Accessibility and utilization of library resources by teachers in secondary schools in the Calabar education zone of Cross River State, Nigeria. *Global Journal of Human-Social Science: Arts & Humanities–Psychology*, *15*(8), 1-12.

Nwokedi, V. C., & Adah, J. (2009). Information needs of post-primary school teachers in Jos, Plateau State, Nigeria. *Information Technologist (The), 6*(2). http://doi.org/10.4314/ict.v6i2.52727

Okoli, G. C., & Azubuike, F. C. A. CLN. (2021). *Information Needs and Information Seeking Behaviour of Secondary School Teachers*. *Library Philosophy and Practice (e-journal)*. 6172. https://digitalcommons.unl.edu/libphilprac/6172

O'Reilly, C. A. (1982). Variations in decision makers' use of information sources: The impact of quality and accessibility of information. *Academy of Management Journal, 25*(4), 756–771. http://doi.org/10.2307/256097

Perrault, A. M. (2009). An Exploratory Study of Biology Teachers' Online Information Seeking Practices. *School Library Media Research*, *10*.

Rafiq, M., & Ameen, K. (2010). Information seeking behavior and user satisfaction of university instructors: A case study. *Library Philosophy and Practice*, *11*(1), 1-12. Sánchez, G., & Valcárcel, M. V. (1999). Science teachers› views and practices in planning for teaching.

Ranaweera, P. (2008). *Importance of information literacy skills for an information literate society.*https://www.researchgate.net/publication/28809097_Importance_of_Informati on_Literacy_skills_for_an_Information_Literate_society

Ray, K., & Day, J. (1998). Student attitudes towards electronic information resources. *Information Research*, *4*(2), 4-2.

Rosenberg, V. (1967). Factors affecting the preferences of industrial personnel for information gathering methods. *Information Storage and Retrieval*, *3*(3), 119-127.

Servais, M. M. (2012). Understanding teachers' information needs, perceived competencies, and information-seeking behaviors for special education information.

Shahzad, K., & Khan, M. T. (2015). Key Trends in Information Seeking of Government College University Lahore Teaching Faculty. *Pakistan Library & Information Science Journal*, *46*(1).Sherab, K., & Dorji, P. (2013). Bhutanese teachers ' pedagogical orientation in the primary classes: a factor on quality education. *Jiste*, *17*(1), 18-28.

Shehryar, M., Khan, G., Jan, S. U., & Akram, S. (2021). Information Needs and Seeking Behavior of School Teachers.Library Philosophy and Practice (e-journal). 5442. https://digitalcommons.unl.edu/libphilprac/5442

Shehryar, M., Khan, G., Jan, S. U., & Akram, S. (2021). Information Needs and Seeking Behavior of School Teachers in Khyber Pakhtunkhwa Pakistan.

Slater, M. (1963). Types of use and user in industrial libraries: Some impressions. *Journal of Documentation*.

Snyman, M., & Heyns, D. (2004). The information needs of Afrikaans teachers. *Mousaion, 22*(2), 211–229.

Tahira, M., & Ameen, K. (2016). Information needs and seeking behavior of science & technology teachers of the University of the Punjab, Lahore. *Pakistan Journal of Information Management and Libraries*, *10*

Thilagavathi, T., & Thirunavukkarasu, A. (2015). Information needs and seeking behavior of faculty members of Avinashilingam University, Coimbatore. *International Journal of Digital Library Services*, *5*(3), 69-76.

Williams, D., Coles, L., Richardson, A., Wilson, K., & Tuson, J. (2000. Integrating information and communications technology in professional practice: an analysis of teachers' needs based on a survey of primary and secondary teachers in Scottish schools. *Journal of Information Technology for Teacher Education, 9*:2, 167-182, DOI:10.1080/14759390000200089

Wilson, T. D. (2000). Human information behavior. *Informing Science*, *3*(2), 49-56.

Woodward, D. G. (1997). Life cycle costing—Theory, information acquisition, and application. *International journal of project management*, *15*(6), 335-344.

Wu, M., Chen, S., & Hsieh, M. (2002). A study of elementary school teachers' searching behavior for instructional resources on the Internet. *Journal of Educational Media and Library Sciences*, *42*(4), 481.

Xie, I., & Joo, S. (2010). Selection of information sources: Accessibility of and familiarity with sources and types of tasks. *Proceedings of the American Society for Information Science and Technology*, *46*(1), 1-1

Yamane, T. (1967). *Statistics: An Introductory Analysis* (2nd Eds). New York: Harper and Row.

Zhang, P., & Benjamin, R. I. (2007). Understanding information related fields: A conceptual framework. *Journal of the American Society for Information Science and Technology*, *58*(13), 1934-1947.