University of Dar es Salaam Library Journal
Vol 13, No 2 (2018), pp-65-79
ISSN: 0856-1818

Exploring students' conceptions of collaborative information use and information use outcomes in credit-based group learning assignments

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Abstract

The purpose of this study was to explore students' conceptual understanding of collaborative information use (CIU) and information use outcomes in the context of credit-based group learning assignments. The study comprised of forestry and architecture undergraduate students from SUA and ARU respectively. Qualitative research design and ethnographic case study research method were used. Study population consisted of 12 groups, 8 from SUA and 4 from ARU. Six groups, two groups from ARU and four from SUA were purposively selected. The Study was carried out for the period of six weeks. Data were collected using observations and Focus Group Discussions. The results indicate multiple conceptions of information use (IU) and information use outcomes. Students' understandings of IU and information use outcomes reflect characteristics of information sources used, learning tasks objectives and tasks dynamics. The study has contributed to deep understanding of different constituents of IU and information use outcomes and the role of information in supporting students' collaborative learning process.

Keywords: *Information use; Collaborative learning, Group learning; informed learning, Information use outcomes*

Introduction

What constitutes information use, when and how information is used and what metrics should be used to study information use are the topics of much debate and less consensus (Kari, 2007; Kari, 2010 and Davies, 2013). The fact that information use is studied from different contexts and across different domains attribute to no unified consensus. Studies of IU have focused on cognitive dimension (Savolainen, 2009, Kari, 2010; Spink and Cole, 2006; Davies, 2013) and social construction dimension (Tuominen and Savolainen, 1997). Focuses on different dimensions of IU, Spink and Cole (2006) argue that there is a need to distinguish looking for information as potential use of information and information use as the real physical and mental acts of incorporating found information into a knowledge base. Within the same line, Todd (2006) holds that IU encompases integration of information into existing knowledge and creation of new knowledge.

The role of information in supporting students' learning activities is well documented (Hyldegård, 2006; Maybee, 2006; Chou and Lo, 2015). From these studies a link between students' learning process and IU behavior has been established and different dimensions of IU have been discussed. Chou and Lo (2015) for instance noted that IU behavior can be better studied in learning context because learning is a personal and social construction process where people actively make sense of information.

Undergraduate students are frequently involved in group learning assignments. These learning assignments require students to accomplish different information intensive learning tasks. In this regard, IU becomes an integral part of the learning process. Students' learning tasks therefore provide suitable scenarios for studying information use and IU outcomes. Despite the proliferation of studies of students' learning based IU, little attention has been paid to explore how IUis understood in collaborative learning by students and what constitute IU outcomes. The paucity of studies on information use and information use outcomes is also reported by Kari (2007 and 2010) and Mahony (2017) who hold that pertinent research on how information is actually utilized is still uncommon. This study therefore examined how students understand different ways in which information is used and what constitutes collaborative information use outcomes during collaborative learning.

The purpose of the study

The purpose of this study was to explore students' conceptions of information use and information use outcomes within the realm of students' collaborative learning assignments.

Research questions

Specifically the study addressed the following research questions:

- How do students' conceptualize information use during group learning processes?
- What are students' conceptions of collaborative information use outcomes?

Contributions of the study

The study has contributed knowledge on our understanding of how students conceptualize CIU both a process and social phenomenon. Likewise, the study has made some contributions in our understanding on what actually constitutes IU outcomes from learners' perspective. Also, the results of this study have shed some new insights into how students apply information in the learning process and the role of information in supporting students' collaborative learning process.

Related literature

Collaborative learning (CL) is a generic term which includes other forms of group learning such as cooperative leaning, social learning, peer learning, team-based learning and collective learning (Dooly, 2008). CL is students-centered and an active learning approach that involve groups of learners working together to accomplish specific learning objectives and outcomes. Shukor *et al* (2014) view CL as learning and thinking processes in which learners learn from each other and collectively create new knowledge.

Thus, CL tasks and sub sets are the building blocks of CL assignments. Learning tasks are usually externally imposed by instructors, with intended learning goals and outcomes to be

accomplished within a specified time frame (Limberg, 2005; Tanni and Sormunen 2008). In relation to information behavior learning tasks can be described as information intensive work (Saleh, 2012) in which learners individually or collectively interact with different sources of information including human in the process of accomplishing specific learning goals. Learning tasks are characterized by symmetrical relationship and mutual benefits.

Several studies have explored students' information use behavior in the learning process (Todd, 2006; Maybee, 2006; Chou and Lo, 2015). These studies focused on understanding students' information use from individual users' perspective (Todd, 2005; Maybee, 2006; Chou and Lo, 2015) and users working on group assignments (Hyldegård, 2006; Foster, 2009; Saleh, 2012). Chou and Lo (2015) also noted that information use in the learning process is iterative and dynamic, involving using existing and other possible information to bridge knowledge gaps.

Guided by the sense-making approach, Li and Todd (2015) examined how graduate students collaboratively make sense of information found during collaborative learning. The results indicate that students' CIU include using information for making sense of the nature and requirements of learning projects, creating awareness about work task situations and accomplishing learning tasks. Todd (2006) examines how students convert information into knowledge during the learning process. The results indicated IU involves progressive addition of new facts, manipulation of facts in different ways including building explanations, synthesizing and organizing facts, reflecting on facts to build positional and predictive conclusions. Chou and Lo (2015) examine different ways of how students use information during learning. Chou and Lo (2015) found that examining, reexamining, extracting and translating information and reconstructing knowledge are dominant students' information use practices. In the study of undergraduates' perceptions of IU, Maybee (2006) is of the opinion that students' conceptual understandings of IU include process of finding information, initiating information use activities and building a knowledge base for various purposes. While the identified conceptions of information used do not address issues of information use in group work, the results highlight students' perceptions of information use which is one of the core objectives of this study. Few studies have also explored students' IU during collaborative learning process (Hyldegård, 2006, Foster, 2009). Foster (2009) examines the functions and forms of dialogic talks that occur among students working on presentations at the planning stage. Different forms of dialogic talks were identified including disputational talk, structuring talk, eliciting talk and informing talk.

Kari (2007) makes a distinction between information use and information use outcomes where, information use relates to what individuals do with information, information outcome is about what information does to individuals. Kari (2007) noted that information is not sought for its own sake but specific purpose. Hence there is a need to look at what happens after a person has turned information entity into knowledge. Despite increasing number of studies on information use in learning, scholars have ignored to study the outcomes or effects of information. The concept of information use outcomes has been on the spotlight of some few researchers (Kari, 2007; Case, 2014; Case and O'Connor, 2015). In their review of research on IU outcome, Case and O'Connor (2015) found that between 1950 and 2012 little has been done to study information use outcomes where only 6.1% of all studies reviewed attempted to measure information use outcomes.

Kari (2010) found that IU outcome as concept with multiple dimensions including negative and positive outcomes or the helps and hurts of information use. Information outcomes according to Kari (2010) also include potential and real outcomes as well as immediate and delayed outcomes. Kari (2010) further holds that the outcomes of information are more important than the information itself and if information does not lead into anything, it is a waste of space and time. Case and O'Connor, (2015) described information use outcome as what happens after information is found or received which include effects such as change of knowledge or change in emotional state or making decisions based on received information.

In the study of CIB of engineering students, Saleh (2012) found that when students use information, they experience change in knowledge, beliefs, behaviors and attitude. Chou and Lo (2015) examined how students' knowledge structure changed after using information. Different indicators of information use outcomes including changing students' knowledge structures through appending, inserting and deleting processes were identified as outcomes. In a different study, Todd (2006) revealed that during group learning, students' knowledge structure changed from unstructured and random listing of facts to structural centrality and conceptual coherence. Todd (2006) also found that students' endpoint representations are characterized by organized facts into thematic groupings, linking thematic groupings into larger more coherent and more conceptual units.

It is evident from the existing literature that there is paucity of studies that have explored students' understanding of IU and IU outcomes during group learning. Apparently, most of the previous researchers have focused their research attention to students' information behavior in learning tasks where aspects such as preferences in using information sources (Todd, 2005) and frequency of use (Limberg, 2005) been studied. Commenting on this gap, Tanni and Sormunen (2008) noted that task based information behavior studies are rarely extended to actual used of information or at least how learners understood information. While there are some researchers who have investigated students' information use during learning process (Todd, 2006; Foster, 2009) these studies considered information users as solitary individuals who use information in solitude to accomplish different learning activities. Likewise, IU outcome is an area which lacks conceptual and empirical investigation. The current study explored how students understand the concept information use and use outcomes when working collaboratively on credit-based group learning assignments.

Research methodology

This study has employed qualitative research design with ethnographic case study research method. The used of multiple ethnographic case study research methods allowed researchers to focus on specific cases and understand different dimensions of information use. In addition, the use ethnographic case research method intended to gather in-depth and context specific qualitative data essential for exploring different conceptual dimensions of IU and use outcomes.

The study population consisted of second year undergraduate students pursuing Bachelor of forestry at Sokoine University of Agriculture (SUA) and fourth year undergraduate students

studying Bachelor of Architecture at Ardhi University (ARU). The two programmes consisted of students working in groups to accomplish different credit based collaborative learning assignments. The purposive selection of the programmes was based on the fact that the programmes offer extended group based fieldwork to students. Group learning assignments offer a good opportunity to explore students' CIU practices and information use outcomes for a prolonged period of time. At the group level, purposive sampling technique was used to select groups from each case study. Criteria for using purposive sampling method include group members' heterogeneity such as sex distribution, needs to include both in-service and fresh from school students and differences in learning tasks objectives and requirements. Study population consisted of 105 students 68 from SUA and 37 from ARU. Sample selection was done at the group level. Six groups, two groups from ARU and four from SUA were purposively selected. Table 1 illustrates:

Table 2: Students' population and sample size

Name of the programme	Students' population in the programme	Number of students groups	Sample size (in groups)
BSc. Forestry (SUA)	68 (2nd year students)	8	4
B. Arch. (ARU)	37 (4th year students)	4	2
Total	105 students	12	6

Source: Field data, 2018

Information use and information use outcomes are more about understanding other persons' minds. Based on that, observation on how students make use of information sought and engaging students in group interviews were considered as the most appropriate methods for collecting data. Combination of data collection techniques were used including field observations, focus group discussion and content analysis of students field reports. Review and analysis of students' content reports was used as a data collection method that complements field observation and FGD.

Research results and discussion

The results presented are based on students' subjective understanding of information use and information use outcomes as well as researcher's observation on how students used various sources of information during learning. Such an approach offers both subjective and objective understanding of information use and information use outcomes. The results are presented and discussed along the following thematic: What are students' conceptions of use during group learning? And what are the outcomes of students' collaborative information use?

Group-based information use

Generally, results indicate that CIU conceptions are embedded within the frameworks of group learning and social environment within which learning processes take place. Students have multiple understandings of CIU, attributed by multiplicity of learning tasks, working on multi-stage assignments and the dynamics of the learning environment. This observation is supported by previous studies including Kari, (2007 and Kari (2010) who noted that information use is a multiform phenomenon with multiple meanings.

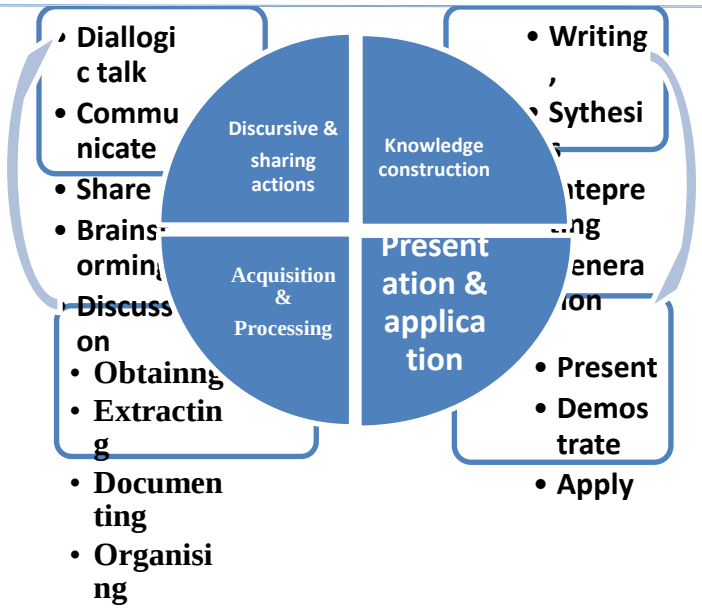
In learning the concept of IU has to do with learners experience about using information as different learning stages. Primarily, students associate information use with activities such as group and individual sense-making, coordinating learning activities, establishing individual and group awareness and common understanding. Such conceptions relate with social use of information in which information is used as a resource for creating and maintaining group work situation awareness and work environment awareness. It is important underlined here is that in group learning processes information use may involve group's construction of new ideas or group members making comparison between information sought and what is known in a group. The study reaffirms the assertion that in task-based information activities, information use is a problem and goal oriented process. Information is instrumentally used to support collaborative learning processes as well as construction of new knowledge.

Students' conceptions of collaborative information use

Collaborative information use, just like other CIB behavioral practices entails human interaction with sources and content of information. CIU is not a separate process or the last stage in CIB process, but a multi-layered process in which students fulfill individual and collaborative information needs and accomplish collaborative learning tasks. This study identified different ways of how information is used by students during group learning. These include the use of information to solve collaborative learning problems, to support coordination of learning activities and creating awareness or common understanding among group members.

To understand how students conceive information use required the researcher to explore the nature of group learning assignments and how learning activities are interwoven with different collaborative information behaviour activities. From such enquiry different conceptions were identified. These conceptions include: information acquisition and process, discursive and sharing conception, information presentation and application conception and knowledge construction conception. The fact that students had multiple conceptions of CIU could also be partially largely attributed to the use of different forms of information sources with a wide range of characteristics. Figure 1 illustrates different information use conceptions:

Figure 1: Collaborative information use conceptions



Sources: Field data, 2018

Collaborative information use: information acquisition and processing dimension

Students conceive information use to include physical processes, activities and practices related to acquisition and processing of both textual and non-textual information. These also include acquisition and processing of other crude forms of information such as data, opinions and suggestions from key informants and experts. The following interview extract provides further elaboration:

> *"We use information in different ways […]we review and document information […]sketch designs of different objects and structures that appear to be of interest to us. We extract information from maps, books and consulting people […]*" [Group Interview, Group 2, ARU]

From the above extract, we know that different terms are used to explain IU processes including extraction of information, consulting people, documenting and sketching diagrams. Information use also meant activities such as understanding the nature of acquired information and organizing information in a meaningful way. This is a typical example of information acquisition and processing conception. In the following interview script one of the students explained how acquisition and processing of information from physical documents in library re important especially in gathering baseline data prior to the commencement of fieldwork and assisting students to comply with field reports requirements:

> *"The fact that we spend more time in the field talking to people and learning through observation does not prevent us from using books and other materials in our library. The library has valuable sources of information."* [Group interview, Group 1, ARU]

The fact that students used different sources of information in different forms such as objects, raw data and oral information makes information processing an integral part of information use.

Within this dimension, information use includes CIB activities such as taking notes, diagrams sketching, extraction and interpretations of information. The fact that students are also collect crude/ raw information such as crude data, information use entails processing, analyzing, discussing and organizing data into meaningful forms.

Collaborative information use: discursive and information sharing dimension

Collaborative information use was described by students as a set of behavioral practices that involve dialogic talking, group discussion and sharing of information obtained from different sources. The fact that students, on several occasions, relied on people as sources of information influenced their conceptual understanding of IU where students developed mental images that IU involves dialogic human interactions. This is in conformity with Kari (2007) observation that that IU includes physical acts of communication or social use of information. Two interrelated processes were identified from this conception. First, information was used discursively during group discussions, brainstorming meetings as well as in intergroup and intra-group informal conversations. These platforms were observable indicators of CIU. It is noteworthy to know that in discursive IU students are considered both as sources of information and users of information. Secondly, students also acknowledged that they consider IU as a process of sharing information among group members and those outside their groups. The following extract explains this thinking:

> *"[…]we are benefit from each other. Collaboration saves time […]; we learn from each other by sharing views, experiences and multiply our knowledge […]"* [Group interview, Group 3, SUA]

Likewise, Information sharing as one of the constituents of IU was linked to instrumental and social use of information. The objectified role of information as a tool for communication and coordinating learning activities was reported and observed. Results indicate that students use information to create learning tasks awareness and shared understanding. One of the respondents noted:

> *"Working in a team like this[…]exposes me to new ideas from fellow students[…] we also remind each other what we have learnt in class[…]This helps us to improve the quality and accuracy of our works.*" [Group interviews, Group 2, ARU]

The shift form "me" [I] mode to "we" mode exemplified in the extract above is a clear indication of the reciprocal nature of information sharing dimension. Information use allows group members not only to gain knowledge but also to contribute knowledge in a group.

Dialogic interactions and dialogic talks are described by Foster (2009) as indicators of forms of IU which occur when learners interact and work towards accomplishment collaborative leaning tasks. Existence of multiple individuals working in explicit collaboration makes human interactions an integral part of CIU.

It should be noted that during collaborative learning, IU rarely takes the form of reading or writing. On the contrary, it involves using information generated during discussions and information extracted from observing living and non-living information objects such as plants

and buildings respectively. Discursive use of information which is characterized by dialogic talk was evident during students' consultations with key informants and experts. Face to face consultations with field instructors and experts in the field not only provided students opportunities for collecting information, but also engaging in discursive use of information through asking questions, seeking clarifications and contributing new ideas.

Collaborative information use: knowledge construction process

The findings confirmed that collaborative information use involves collective attempts by students to generate new knowledge. Within this dimension, students' CIU was directly related to learning assignments' objectives and specific learning task requirements. Students had information and knowledge related to the areas of their study before they began field work. Information collected during fieldwork was an important ingredient in the construction of new knowledge. Knowledge construction process was associated with learning practices such as report writing, information synthesis, data aggregation and analysis. The following interview extract illustrates this more clearly;

> *"[…] Working in group is more rewarding since it involves group discussions which generate new knowledge…enhances cross pollination of ideas and knowledge. At the end of the day we achieve better results within a short period of time than doing it alone."* [Group interview 4, Group 4]

Collaborative information use: presentation and application dimension

Like knowledge construction, representation of information and knowledge dimension of IU was linked to learning objectives. Admittedly, knowledge and information representation go beyond analyzing, processing and documenting acquired information. It includes presenting constructed knowledge to meet learning task requirements as well as current and future application of knowledge. The following interview extract elaborates this further:

> *"This fieldwork exposed me to different information and practicals as a future forester […]I believe in the future I will apply the knowledge that I have gained."* [Case study 1, Group 2]

The above extract shows how students expect to apply both theoretical knowledge acquired in class and practical information acquired in the field.

Students' conceptions of information use outcomes

Different dimensions of information use outcomes were noted. Generally, students' conceptions of IU outcomes reflect information use conceptions. Students' understandings of what constitute IU outcomes primarily reflect three learning stages namely; task initiation, task implementation and task completion. IU outcomes were also found to be influenced by learning task objectives, characteristics of information sources used and forms of collaboration. IU outcomes were associated with outcomes such as increased group awareness, creating common understanding,

fact finding and confirmation, ability to solve learning based problem and changes of individual and group knowledge base. Table 2 one summarizes the results:

Table 2: Students information use outcomes

Students conception of information use outcomes	Indicators of information use outcomes	References
Knowledge of new information sources	Identification of new information sources	Case study 1 [SUA] Ethnographic observation
Common understanding / group awareness; shared knowledge	Shared focus; increased awareness, learning task understanding, problem understanding, understanding learning environment	Case study 2 [ARU] & Case study 1 [SUA]
Building new knowledge	Knowledge enhanced, increased sense of subject mastery, self/ group-efficacy, gaining practical knowledge	Case study 2 [ARU] & Case Study 1 [SUA]
Change emotion state	Confusion, contestation, uncertainty, frustrated, motivate, feeling better	Case study 2 [ARU] & Case Study 1 [SUA] Ethnographic observation
Completing learning assignments	complete a task, Submission of field reports, field report presentations,	Case study 2 [ARU] & Case Study 1 [SUA] Ethnographic observation

Sources: Field data, 2018

Identification of new information sources

Identification and eventually use of other sources of information which were previously not known to learners were one of the results of using information in learning. When students use information, they are not only using information but are also exposed to new information through recommendations and referrals. Students were referred to other sources including experts and key informants considered to be more informed and knowledgeable on the subject matter. Such exposure is an outcome of previously used information. During group interview, one of the students remarked as follows:

> *"Most of those interviewees were identified by our instructors […] also after consulting different sources of information we came across to other sources."* [Case study 1, Group 4]

With regard to the use of human sources of information, one of the respondents commented:

> *"When we don't find relevant information we prefer to ask some of our colleagues who have done similar assignments in previous year. They are more experienced and always recommend the right people we should consult."* [Case study 2, Group 1]

These results confirm observation made by Mahony (2017) who found that opinions and referrals that information users received from other sources greatly influence users' decisions to use other information sources. This is a typical example of the chaining process where information users may decide to follow links other sources of information after using certain information sources.

Increased group awareness, common understanding and group awareness

Kari (2007) in his conceptual model of information outcome identified the "helps" and the "hurts" as main categories of effects of IU. In connection to discursive use of information and information sharing, results indicate that the use of information resulted in creation of common understanding among group members. It is reported in this study that students use information instrumentally both as a resource and tool for creating awareness, coordinating activities, solving learning problems and making informed decisions. These observations are in agreement with Kari (2007) notion of "help" where once used it may contribute to increased awareness, change in perceptions or improved performance. Students' information use helped to create and nurture common understanding, shared focus and group awareness. The following interview extract elaborates on this as follows:

> *"Last week when we were cutting down trees and taking measurements one of our group members was almost crushed by a tree […] since that incident we have been taking necessary precautions […]We know how to properly use different safety gears while in the field."* [Case study 1, Group 4]

When we accomplish different learning tasks; students engage in both complementary and integrative collaboration modes. Such dynamic shift has some implications on information use outcomes. Complementary collaboration is characterized by task distribution across group members while during integrative collaboration information from different contributors is synthesized and assimilated in the group. The facts that in complementary collaboration students use information in solitary created a need for reporting back to group members. Group members had a role to confirm previously use of information before integrating it into to the group knowledge base. This was partly done to create a shared focus as well as to confirm and verify information collected and used at the individual level. This observation is supported in the following interview extract:

> *"Depending on what we want to achieve in different activities, we need to collect different information[…]sometimes when we finish collecting information and start analyzing we realize that we need more information as to complete the assignment. This requires us to go back and take measurements and start processing data.* [Case study 1, Group interview 2]

Developing new knowledge and sense of mastery

Students identified developing new knowledge and new points of views as some of the outcomes of using information. Students' IU outcomes include: change of group and individual knowledge base and increased confidence to share information with others. Results also indicate that students expressed a sense of subject mastery and self and group efficacy. The following

interview extract shows how students' knowledge base changed following participating in group learning assignments.

> *"When we went to the agro-forestry farmers I had what I thought was an exhaustive list of different agro-forestry systems that was taught in class…To my surprise, participating in field work exposed me to different agro-forestry systems practiced by local people which I was not aware existed."* [Case study 1, Group interview 1].

Development of knew knowledge was also associated with students desire and anticipation to demonstrate and use new knowledge and skills in the future including in work places. The following interview extract illustrates this:

> *"[…] this was the best opportunity for me to interact with colleagues and experienced experts in the field […] it helped me to acquire more knowledge i can use in the future when I get employment."* [Case study 1, Group 1]

Improving understanding is considered as one of the intrinsic outcomes of information use. Another respondent commented with regard to developing new knowledge and skills:

> *"[…] in groups we have the opportunity to ask questions and seek clarification to improve our understanding"* [Case study 2, Group 2].

This indicates that IU outcomes include increased students' creativity; expended experiences and s construction of new information and knowledge.

Increased confusion and misunderstanding

it is not all the time that information use had positive results for students. In some occasions, students reported to have experienced negative outcomes. This is what Kari (2007) calls information use "hurts". Acquisition and use of information in some cases, lead to contested collaboration, increased feeling of confusion, misunderstanding, and uncertainty. The following extract clarifies this even expresses more:

> *"The fact that we work together guided by similar objectives does not mean that every process will be smooth. Sometimes we spend more time debating the way forward.* [Case study 1, Group, 1]

Despite confusion, misunderstanding and contestation which resulted from using contradicting information, students reported to have found their way out as the following student remarks:

> *[…]we always find best ways to proceed by listening to each other, assessing the ideas of every group member and considering each group member's ideas as important to the completion of our assignments.* [Case study 1, Group, 1]

Task completion

The ultimate goal of engaging in CIU is to accomplish collaborative learning tasks. The relationship between collaboration and information behavior is best explained in two scenarios.

On the one hand, in one scenario of relationships information is used to support CIB activities where collaboration is motivated by the desire to solve information related problems. On the other hand in scenario, two CIB activities including collaborative information use are used to support collaboration. This makes the relationship between collaborative learning and collaborative information behavioral practices to be symmetrical and reciprocal. These results indicate that different accomplishments such as specific learning task completion, preparation of mandatory field reports, and presentation of final field reports to the faculty members are notable outcomes of information use. In this regards IU outcomes are associated with students' learning and achievements of learning objective and requirements. These results support Kari (2007) observation that the "help" outcomes of information use may also include completing tasks, learning and new discoveries.

Conclusions

It is evident from these findings that students' understanding perceived IU with relation to characteristic of information sources used and characteristic of learning tasks including task requirements and learning task phases. The results further indicate that CIU involves both extraction of information and constructions of new knowledge. Information and knowledge were constructed through discursive interactions and dialogic informal talks. On the one hand extraction aspect of IU was evident from CIB practices such as observing natural and manmade objects, documenting and sketching as well as and consultations. It is evident on the other hand IU is also more than integrating information into individual knowledge. It is argued in this study that information use involves information acquisition, sharing and other forms of human interactions with information sources such as note taking, processing, extracting, discussing and application of information. Such view of IU provides a broader understanding of different constituents of IU and show how IU relates to other information behavioral processes. In addition, information use is not a final point in the information behavioral processes. Students use information at different stages to construct new ideas and knowledge, create awareness, coordinate activities and solve learning problems. Based on these observations, the study concludes that in group learning based information behavior there is no single factor that can be used to explain students' conceptual understanding of CIU and information use outcomes. Students' information use is a multifaceted process in which students interact with different forms of information sources including human beings.

References

Case, O. (2014). Sixty years of measuring the use of information and its sources: from consultation to application. *Libraries in digital age (LIDA) proceedings: Assessing libraries, library users and use*, 13 (2014).

Case, O. and L.G. O'Connor. (2015). "What's the use? Measuring the frequency of studies of information outcomes." *Journal of the Association for Information Science and Technology*, 67(3), 649–661.

Chou, C.J, Lo, , S. (2015). "Exploring information use behavior in the context of knowledge construction." *Journal of Library and Information Studies,* 13(2),1-27.

Davies, R. (2013). Towards a model of information behavior of an information provider: a mixed method study. (PhD dissertation). Aberdeen: Robert Gordon University.

Dooly, M. (2008). "Constructing knowledge together." *Telecollaborative Language Learning*, edited by Melinda Dooly. Bern: Peter Lang, pp21-44.

Ellis, D. (1989). "A behavioural approach to information retrieval design." *Journal of Documentation*, 45(3), 171-212.

Foster, J. (2009). "Understanding interaction in information seeking and use as a discourse: a dialogic approach." *Journal of Documentation* 65 (1),83-105.

Hyldegård, J. (2006). Between individual and group – exploring group members' information behavior in context. (PhD dissertation). Copenhagen: Loyal school of information studies.

Jaeger, P.T. and Burnett, G. (2010). *Information worlds: social context, technology, and information behaviour in the age of Internet*. New York: Routledge.

Kari, J. (2007). Conceptualizing the personal outcomes of information. *Information Research*, 12(2), paper 292. http://informationr.net/ir/12-2/paper292.html [Accessed 2016 January 21st].

Kari, J. (2010). Diversity in the conceptions of information use. *Information Research*. 15(3): paper no. 709. http://informationr.net/ir/15-3/colis7/colis709.html [Accessed 2015 December 13th].

Karunakaran, A., Spence P. R and Reddy, M.C. (2010). Towards a model of collaborative information behavior. Paper presented at ACM Conference Computer Supported Cooperative held in Savannah, Georgia 7, February http://workshops.fxpal.com/cscw2010cis/submissions/tmp10.pdf [Accessed 2013 March 4th].

Kenney, B (2008). The transformative library: a narrative inquiry into the outcomes of information use. (PhD thesis). Texas: University of Texas.

Li, X. and R.J Todd. (2015). Graduate students' sense-making processes in collaborative learning tasks. http://www.ideals.illinois.edu/bitstream/handle/2142/7361/464_ready.pdf [Accessed 2018 October 6th].

Limberg, L. (2005), "Experiencing information seeking and learning: research on patterns of variation." Introducing Information Management, edited by Macevic´iute˙, E. and T.D. Wilson. London: Facet, pp. 68-80.

Mahony, C. (2017). Exploring the Information behaviour of expectant and new mothers: a longitudinal study. PhD Thesis. Cork: National University College of Ireland.

Maybee, C. (2006). "Undergraduates perceptions of information use: the basis for creating user centred students information literacy instructions." *Journal of Academic Librarianship*, 32 (1), 79-85.

Poteri, E. (2007). Collaborative information behaviour: a case study of two research groups. Licentiate thesis. Turku: Abo Akademi University.

Saleh, N. (2012). Collaborative information behaviour in learning tasks: a study of engineering students. (PhD thesis). Montreal: McGrill University.

Savolainen, R. (2009). Epistemic work and knowing in practice as conceptualizations of information use. *Information Research*, 14(1), paper 392 http://informationr.net/ir/14-1/paper392.html [Accessed 2018, March 9th].

Shukor, N. A., Z Tasir; H. Van der Meijden and J. Harun. (2014). "Exploring Students' Knowledge Construction Strategies in Computer-Supported Collaborative Learning Discussions Using Sequential Analysis." *Educational Technology and Society*, 17 (4), 216–228.

Spink, A. and C Cole. (2006). "Human Information Behavior: integrating diverse approaches and information use." *Journal of the American Society for Information Science and Technology*, 57(l), 25-35.

Tanni, M and E, Sormunen. (2008). "A critical Review of Research on Information Behavior in Assigned Learning Tasks." *Journal of Documentation*, 64(6), 893-914.

Todd, R.J. (2006). From information to knowledge: charting and measuring changes in students' knowledge of a curriculum topic. *Information Research*, 11(4), paper 264. http://InformationR.net/ir/11-4/paper264.html [Accessed 2018 November 7th].

Tuominen, K and R, Savolainen (1997). "A social constructionist approach to the study of information use as discursive action." *A paper presented at the International Conference on Research in Information needs, seeking and use in Different Contexts*, Tampere, Finland.