

Collaborative Information Behaviour in Completely Online Groups: Exploring the Social Dimensions of Information in Virtual Environments

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Abstract: Teamwork is encouraged nowadays as an imperative skill to better perform all critical factors, including information, that are involved in the project-based structures of many organizations. Due to the inherently collaborative nature of group activities, when groups search, retrieve, manage and disseminate information, new relationships with information emerge which result in collaborative informational behaviours. The aim of this research was to study a specific case of collaborative information behaviour in completely online groups, which initiated, developed and completed a teamwork project in the virtual learning environment of the Open University of Catalonia's Virtual Campus. The study methodologically developed a multidimensional analytical approach, built from a set of twelve interrelated variables in three dimensions. A field study was conducted using virtual ethnographic techniques. Findings reveal that the collaborative information behaviour in completely online groups seems to be particularly influenced by the factors related to the internal group dynamics (e.g. leadership style, degree of cohesion, or group rules).

Keywords: Information behaviour. Collaboration. Online groups. Virtual teamwork. Virtual learning environments. Case study. Virtual ethnography.

1. Introduction

'Has there been a sociological turn in Information Science?', asked Cronin (2008) himself when, considering the evolution of some issues in Library and Information Science (LIS), realised that certain subfields evolved and matured so much thanks, in part, of appropriating insights, both theoretical and methodological, from the social sciences. After shortly revising the history of "the social" in information science, the answer he finally came up with was something like "No: *the social* has always been here in LIS".

Below is a brief outline of my Master Thesis on collaborative information behaviour (Hernández, 2014) from a "social" perspective. Collaboration needs

at least two people who “*work jointly on an activity or a project*”, which is precisely the notion of a group (*Oxford English Dictionary*). Assuming that groups are individuals’ minimal social units (Johnson and Johnson, 1996), whenever we want to investigate about collaboration, “the social” perspective should always be taken into account. The following case study seeks to generate knowledge about the effects in collaboration of group dynamics when groups manage information in teamwork.

1.1. Collaborative Information Behavior (CIB)

Research on informational behaviour has awoken the interest of many researchers for more than a century (Case, 2012, p. 272, dated the first studies on uses of information in 1902), but until the late 90's the different models conceptualizing the phenomenon have adopted the same perspective: informational behaviour is an inherently individual activity (Kuhlthau, 1991; Byström and Järvelin, 1995; Wilson, 1999).

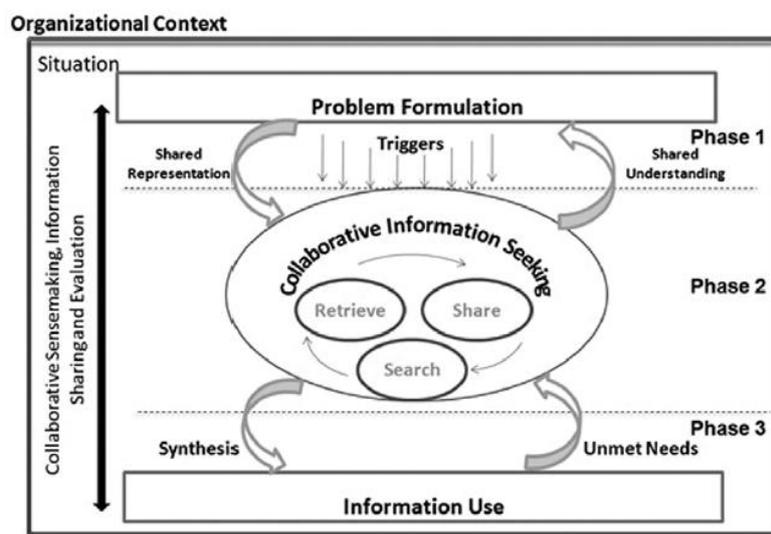
Since Karamuftuoglu (1998), collaboration was considered as a relevant factor in the study of information retrieval but ten years later Reddy and Jansen (2008), pointed out that research on informational behaviour still tended to interpret the tasks within organizations as a series of individual activities: except notable exceptions, collaborative aspects of the informational behaviour were only tangentially addressed.

The development of more collaborative social dynamics due to the extension of the *network society* as the characteristic social structure in the 21st. century (Castells, 2006, p. 70), and the development of new technological tools based on collaboration after the expansion of Web 2.0 (Schäfer, 2011, p. 35-39), have configured collaboration, cooperation and sharing as inherent activities related to many processes and situations (Hyldegård, 2006).

Karunakaran, Reddy y Spence (2013) synthesize up to date theory and research produced on collaborative informational behaviour and propose the following definition: “*the totality of behaviour exhibited when people work together to (a) understand and formulate an information need through the help of shared representations; (b) seek the needed information through a cyclical process of searching, retrieving, and sharing; and (c) put the found information to use*” (op. cit., p. 2438).

Their *Model of Collaborative Information Behavior in Organizations* (op. cit., pp. 2443-7) is one of the most recent contributions to CIB. The authors pose that CIB comprises a set of activities that take place in three phases: problem formulation, collaborative information seeking and use of information. Some activities are specific to a particular phase, while others are common to all phases. The model explains how these constituent CIB activities are related to each other, and how the organizational context is also a key element in order to understand the informational collaborative practices of any teamwork.

Figure 1. A model of collaborative information behavior in organizations (Karunakaran, Reddy y Spence, 2013, p. 2443).



1.2. CIB and social groups

Social groups need to work together to achieve their common goals: opposing competitive behaviour or individualism, collaborative behaviour favours the maximum benefit for all parties (Hewstone, 1992, pp 283-304.). Research in Social Psychology shows that the greater the trust between group members, the higher the tendency towards collaboration in social groups (Bergman *et al.*, 2012; Chaudhuri *et al.*, 2002), and the greater are frequency and opportunities to communicate (Deutsch, 1958; Meleady *et al.*, 2013). Cohesion and group norms, two of the main constituents that give unity to groups, directly affect collaboration too: members of highly cohesive groups show strong adherence to group norms and are more collaborative (Van Vugt and Hart, 2004; Livingstone *et al.*, 2011). Collaboration is also largely determined by the factors related to the differentiated positions that can be observed among the members of a group, such as roles and leadership (Bergman *et al.*, 2012), and the group communications network, which reflects who communicates with whom (Hogg and Vaughan, 2011, pp. 303-305). Finally, research shows that decision making has a clear effect on collaborative behaviour (Hopthrow and Hulbert, 2005).

The study of CIB in task-oriented small groups has revealed interesting findings. Reddy and Jansen (2008) indicate that, when certain *triggers* activate CIB, communication and personal interaction, rather than the use of technological artefacts, turn into the key elements of the group dynamics. Fidel *et al.* (2004) analyzed the interaction dynamics of different groups during

decision making and problems solving and, among other things, observed that individual expertise of each member could potentially benefit the whole teamwork. Sonnewald and Pierce (2000) also highlight the importance of interaction in CIB: group members need to develop and maintain *interwoven situational awareness*, a sort of shared understanding about the situation which is determinant for a better group performance. Awareness concerning the tasks that each member of the team carries out has revealed a significant factor in CIB (Hansen and Järvelin, 2005; Shah, 2010). Hyldegård (2006) found that the more cohesive a group is, the more their members approach each other in order to ask for information or to validate the information retrieved. Reddy, Jansen and Spence (2010), added that the group itself also acts as a validator of the information individually retrieved. Hertzum (2008) indicates that CIB requires some kind of agreement between group members and a shared sense of the informational situation, a *common ground*, as he defined it.

1.3. CIB in completely online groups

Research on virtual environments has uncovered some factors that facilitate collaboration between the members of a group: trust (Altschuller and Benbunan-Fich, 2010; Jarvenpaa *et al.*, 1998; Smith, 2008), familiarity (Janssen *et al.*, 2009) and interaction (Oliveira *et al.*, 2011), are some of them. Several authors, and from different disciplines, emphasize that social presence is a particularly relevant factor to understand collaborative dynamics of online groups (Kim *et al.*, 2011; Francescato *et al.*, 2006; Remesal and Colomina; 2013). Social presence is the degree of consciousness developed between group members which is not only determined by the degree of consciousness of the other, but also by the specific consciousness regarding the relationship between the group members, as well as the levels of proximity between them and adherence to the group.

Research on collaborative information behaviour in completely online groups reveals understandings of the phenomenon distinct from those related to collaborative information behaviour in face-to-face groups (Goggins and Erdelez, 2010). Completely online groups are characteristically defined by initiating, developing and completing teamwork projects in specific online environments. Goggins and Erdelez (*op. cit.*, pp. 109-110) add that group members also share three distinctive characteristics: a common organizational affiliation, an externally assigned membership (usually by a manager or an academic responsible), and the fact that they do not meet face-to-face.

This kind of virtual, timeless and asynchronous communication is nowadays the ordinary context for many teams. Completely online groups are a fact in large organizations with transversal teams geographically distributed; become indispensable in worldwide scientific research networks; and constitute a powerful pedagogical tool in virtual learning environments for students to acquire personal and collaborative teamwork skills. This last scenario is precisely where the fieldwork of this research is placed.

2. Methodology

This research explores three fundamental questions related to the conceptual framework exposed above: a) what informational collaborative practices students develop in a virtual learning environment when performing teamwork?; b) how is this observed collaborative information behaviour characterized from the following point of views: communication between members, the intragroupal dynamics (here called the social dimension), and the technological-informational factors?; c) can any tendency be observed in the collaborative informational behaviours of the studied groups?

Methodologically, a multidimensional analytical approach has been built based on twelve factors that the literature review uncovered as significantly relevant to understand the collaborative information behaviour of completely online groups. The analysis of these factors suggests a categorization under three broad dimensions in order to facilitate the approach to the phenomenon and the apprehension of their meanings; the three dimensions are: communicative, technological-informational and social.

Table 1. A multidimensional approach of twelve factors that affect collaborative information behaviour (Source: compiled by author)

Social Dimension	Communicative Dimension	Technologic & Informational Dimension
Group cohesion	Communication frequency	Information flow
Festinger, Schachter & Back, 1950; Hertzum, 2008	Deutsch, 1958; Wichman, 1970	Karunakaran <i>et al.</i> , 2013; Goggins & Erdelez, 2010
Leadership	Social presence	Technological artefacts
Casimir, 2001; Bergman <i>et al.</i> , 2012; Goggins & Erdelez, 2010	Francescato <i>et al.</i> , 2006; Remesal & Colomina, 2013; Kim <i>et al.</i> , 2012	González-Ibáñez <i>et al.</i> , 2013; Goggins & Erdelez, 2010
Decision making	Communication network	Collaborative sense making
Hopthrow y Hulbert, 2005; Davis, 1973; Hertzum, 2008; Fidel <i>et al.</i> , 2004	Hogg & Vaughan, 2011; Sonnenwald & Pierce, 2000	Karunakaran <i>et al.</i> , 2013; Hertzum, 2008
Group norms	Trust	Information resources
Sherif, 1935; Zander, 1971; Van Vugt & Hart, 2004; Livingstone <i>et al.</i> , 2011; Janssen <i>et al.</i> , 2009	Altschuller & Benbunan-Fich, 2010; Chaudhuri <i>et al.</i> , 2002; Jarvenpaa <i>et al.</i> , 1998; Oliveira <i>et al.</i> , 2011; Smith, 2008	Goggins & Erdelez, 2010; Reddy & Jansen, 2008; Reddy & Spence, 2008; Sonnenwald, 2005

A field study was conducted during the second semester of the course 2014-2015 among undergraduate students of the degree in Audiovisual Communication of the UOC - Open University of Catalonia (Spain), a completely online university. Prerequisites to participate in the study were that students were carrying out just that semester a group work and that the whole group wanted to get involved in the study. A call for collaboration message addressed to the students was composed, specifying the purpose of the study and giving details of the terms of participation: UOC's collaborating teaching staff of the specific subject *ICT Competences in Communication* collaborated with this research by posting this message on the board of their virtual classrooms. Three working groups responded to the call: divided into two groups of three members and one group of four, ten students in total and located across the whole country. The groups had the assignment of developing an entire audiovisual project (script, pre-production, editing, post-production and distribution), based on the use of several Web 2.0 and open software technologies, that is, using tools that potentially support collaborative media creation in a virtual context (Ornellas and Muñoz Carril, 2014).

Virtual ethnographic techniques (Hine, 2000) were used in order to collect data on collaborative informational practices of the three completely online groups. Ten semi-structured interviews were conducted based on a set of topics that covered the twelve factors of the multidimensional approach. Open-ended questions were proposed in order to facilitate the free expression of students' experiences; however, a conceptual schema, an "*initial set of anticipated meanings*" (Babbie, 2007), was built on the basis of the Model of Collaborative Information Behavior in Organizations (see fig. 1), that is, with the questions clustered into the three major areas of the informational process. Interviews were registered (each lasting 40 minutes on average), transcribed and analyzed using content analysis techniques in order to infer and understand the meanings of these qualitative data. Units of meaning were isolated, codified and relations were established between the different meanings that collaborative informational practices took for each of the members of the three groups analyzed and also for each group as a whole.

The case study was complemented with a short online questionnaire administered to each individual before the online interview. The questionnaire covered the twelve factors of the multidimensional approach (fig. 2), and served to capture an initial understanding of the informational collaborative practices that later, during the interview, were explored in depth. Therefore, these data were conceived only as a starting point, an initial complement for the qualitative analysis described above.

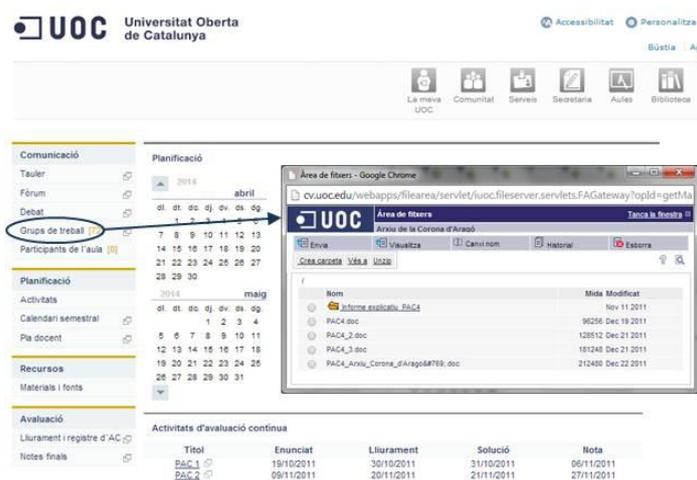
3. Results

Content analysis revealed three core elements that particularly impacted on informational collaborative practices of the completely online groups studied:

the use of communication tools, the role of information resources and the influence of group dynamics in collaboration.

The three groups had huge communication needs during the first phase of the collaborative informational process, the problem formulation (see fig. 1). During this phase, all informants explained that the group members needed to communicate very frequently because they had to clarify the objectives, to plan the implementation of the project and to start reaching out to make the first agreements, for instance, about task performing responsibilities. The members of the three groups agreed that the communication tools of the UOC's virtual learning environment did not cover these communication needs, not even in the *Work group* functionality of the virtual classroom (see fig. 2), which is a restricted space for each class group with specific tools for sharing and communicating (e.g., forum, file exchange, board). The informants detailed the main reasons: first that the virtual learning environment offered tools which were basically asynchronous (except the general chat of the Virtual Campus), and second that the access to these communication tools was exclusively through the virtual environment.

Figure 2. UOC's virtual classroom (file exchange area in the Work group space displayed below).



In order to solve those difficulties, the groups adopted a new communication tool outside the limits of the virtual environment: Whatsapp. Followed by the *Work group* space in the virtual classroom and the e-mail, Whatsapp was the first communication tool used by the groups in this phase: as a quasi-synchronous tool and associated with mobile phones, it gave the groups the high speed and easiness they needed. Whatsapp was very important during this phase

for the three groups because it helped them to take the first decisions and also to generate collaborative sense making, that is, a shared vision about the information required to carry out the project, about the tools the group would use to share this information, and about the planning documents they would need, among other aspects.

When the groups started to shift towards the second phase of the model, collaborative information seeking, communication needs decreased: the base of collaboration was already structured and the framework for the development of the project was already established. At this stage, the three groups took different informational decisions about the use of Whatsapp. The natural leader of one of the groups realized that due to the large number of messages daily generated in the Whatsapp group, relevant information that was being exchanged was not easily reachable, nor stored in a common, safe and accessible space. Because of that, the group leader introduced the informational practice of summarizing the agreements achieved during Whatsapp conversations in a separate document, as meeting minutes; afterwards, this document was shared in a Google Docs folder so that the rest of the group could collaboratively review and validate it. Therefore, this group integrated new collaborative informational practices to avoid the negative effects that brought the adoption of a new technological tool of communication.

The group in which emerged a shared leadership style also restructured their information practices during this second phase of the process. Whatsapp was occasionally used and communication between the members was replaced from strictly communication tools to other technological tools more focused on creation of documents and information sharing but with a communicative component as well. The more illustrative example of this shift is Google Docs: this group created and stored in Google Docs a lot of shared documents with the purpose of establishing some internal rules (e.g., regarding the distribution of functions), or taking decisions about technical elements of the audiovisual project (e.g., visual continuity, hierarchical timing, transitioning), and even documents for planning and task timing.

The other groups also created various shared documents that helped them to structure collaboration, but this group presented two specific characteristics: the members were particularly collaborative in the development of these documents and the group especially maximized the functionalities that offered the technological tools. For example, the members transferred the key dates of the planning document to a shared Google Calendar, which was enriched with additional information such as expected absences for personal reasons that would impede the connectivity of the members to the Virtual Campus, and the concrete responsibilities that the members held during the different phases of the project. This calendar was synchronized with the personal emails of the group members, which in turn were synchronized with their mobile devices: thanks to the alert system that Google Calendar provides, the members received alerts on

their mobile phones that informed them of the project key dates, so that everyone had detailed information on the project progress. This practice also had a strong impact on the perceived social presence of the group, since everyone knew with a high degree of certainty what the other students were doing at any given time.

The group where a non-inclusive individual leadership emerged, however, continued using Whatsapp during this second phase not only to communicate, but also to reach agreements, exchange relevant information on the project, evaluate the information that the members were providing... In short: it was the main technological tool, both for communication and for the development of their collaborative informational practices.

The problems arose when one member lost the initial availability of access to the technological tool: because of working issues (frequent business meetings and travels), Whatsapp connections of this member became more and more limited. *“Every time I switched on the cell phone after a meeting I found tons of messages and I could not read them all, I briefly went over them, and the problem was that I lost information”*, this member related during the interview. The group did not make any improvement to solve this information overload provoked by revolving collaboration around a single technological tool.

Loss of information was one of its consequences, but the internal dynamics of the group were also affected. This group hold synchronous work meetings through Whatsapp that the member with connectivity difficulties could not attend: this member did not always get involved in decision making, was unaware of many agreements reached by the group, had fewer opportunities to get engaged in some tasks and transgressed certain compromises simply because were unknown by this member. Conflicts rapidly emerged, because in the eyes of the other group members, the behaviour of this member was seen as deviating and lacking commitment. The communication network of the group also suffered: this was the only studied group that did not have a fully connected communication structure among its members, since a person was excluded on several occasions and a subgroup was formed. Cohesion therefore got weakened and this directly impacted on the collaborative practices of the group: communication frequency decreased, and consequently the exchange of information decreased as well; adherence to rules and loyalty among group members were also reduced.

The collaborative informational behaviour exhibited by this group was very affected by all this circumstances: not all members participated in the collaborative review of the documents generated by the group, in the collaborative evaluation of the information retrieved, and in the collaborative enrichment of the information that would be used for the final audiovisual product.

Finally, the leadership style had a clear impact on the collaborative information behaviour of the three groups. The analysis revealed three different leadership styles in each group: shared leadership, inclusive individual leadership and non-inclusive individual leadership. Shared leadership was a facilitating factor for the development of collaborative informational practices: the group where this style of leadership emerged showed higher levels of internal cohesion and its members shared a stronger common imaginary about the informational elements of the project, like their information needs, the technological tools the group would use to manage information, and the shared documents the group should create for a better task performance. Likewise, the inclusive individual leader of another of the studied groups made decisions that were crucial to encourage collaborative informational practices. On the contrary, in the group where a non-inclusive individual leadership style emerged, the informational decisions of the leader inhibited the appearance of strong collaborative informational practices: many of these decisions caused that the information flows remained often interrupted, which provoked informational silences that affected the development of the tasks.

4. Conclusions

This research contributes a new multidimensional approach to the study of collaborative information behaviour. The multidimensional methodological approach of this study opens new perspectives for the study of collaborative informational behaviour: the holistic approach on the phenomenon lies under the basis that, like any other human behaviour expressed through a social group, CIB is a complex phenomenon that involves multiple factors.

Findings uncover that collaborative information behaviour is largely determined by the way that online groups use technology. In particular, the results reveal that mobile devices displace communications between group members out of the virtual learning environment, and this phenomenon clearly impacts collaborative information behaviour. Depending on the use of mobile devices, in some cases (e.g., redirection of informational elements, like e-mail or work calendar) collaborative practices could be reinforced because information flows become continuous within the teamwork. But in some cases (e.g., centrality of a single communication technology), collaborative informational practices could get weaker because information overload tends to appear.

Findings also uncover that the creation of different shared information resources is a central element that structures the informational collaborative practices of completely online groups: through shared documents, groups make decisions about the information they need, or establish criteria for evaluating the quality of the information retrieved.

Finally, findings reveal that the leadership style has a significant effect on collaborative information behaviour, facilitating or inhibiting collaborative informational practices. In groups where a shared leadership style emerges,

group cohesion is higher and leads to a common and shared understanding about the informational needs, the technological tools for sharing information, or the information resources that should be sought.

Results underline that there should be a good balance between the three dimensions for a group to exhibit successful collaborative informational practices. Specifically, collaborative information behaviour in completely online groups seems to be particularly influenced by the socio-relational dimension, that is, the factors related to the internal group dynamics. Groups with poor cohesion, or with slightly inclusive leadership style, or with members frequently deviating from group norms, are predicted to less likely succeed in collaborative informational practices.

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