

Symmetric Information Interaction Model: Redefinition Of the Place of Technology in Information Interaction

Ayooob Nazi 

PhD, Knowledge and Information Science, Central
bank of Iran, Tehran, Iran.

Rahman
Sharifzadeh 

Assistant Professor, IranDoc, Tehran, Iran.

Gholamreza
Heidari 

Associate Professor, Knowledge and Information
Science, Razi University, Kermanshah, Iran.

Abstract

The aim of this study is to review and redefine the interaction process with information based on a holistic approach. The data required for this qualitative study were collected through semi-structured interviews among 18 individuals and analyzed using thematic analysis. The network of themes making up the information interactions consists of 5 global themes which have been extracted among 23 organizing ones. These themes include the beginning, orientation, networking and consolidation, which can be interpreted in terms of the symmetry theme as a kind of looking at humans and non-humans in a three-layered context including the internal, external and technology-tools contexts. The new view of interaction with information has taken it beyond the interpretation scope from the human user's perspective and observes it alongside non-human factors. As a result of such an approach, the non-human factors in the role of infrastructure and technology-tool context, meet specific and

* Corresponding Author: a.danaei@semnanaiu.ac.ir

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interpretable effects along with human ones, external and internal contexts.

Keywords: Information interaction, information seeking, symmetric model, technology agency, human, non-human.

Introduction

The two main approaches in the field of human-information interaction are including the system- and user-oriented ones (Agarwal, 2009). Accordingly, the two established focal and research areas are the information retrieval and information-seeking behavior (Fidel, 2012; Rochester & Vakkari, 1998).

The information retrieval field is based upon the system-oriented viewpoints that focus on the human interactions with the system and investigate the information resources and how to use them with an objective perspective. However, the perspectives in the field of information seeking behavior are based on a human-centered approach and emphasize the needs of people to use information resources in specific information environments (Lakshminarayanan, 2010).

Historically, until the 1970s, the dominant approach to research was system-oriented (Vakkari, 1999). However, since the 1970s, the studies have oriented towards the individual as a creative explorer and information user (Case, 2016). Therefore, the studies shifted from a system-oriented approach to the user-oriented one (Choo and Auster, 1993: 39). However, in both major approaches, the concepts of system and user are very abstract and general and have no clear definition; “The concept of system is very abstract, general, and not clearly described, ... The concept of user is also very abstract and general, ... Abstracting the categories system and user to a level in which many different underlying causal mechanisms are mixed together in ways that hinder an adequate understanding ...” (Hjørland, 2010). Each of these approaches highlights the selective aspects of the same process and represents similar processes in different words (Spink & Cole, 2006). Nevertheless, several researchers such as (Belkin, 1993; Ingwersen, 1996; Marchionini, 1995; Saracevic & Kantor, 1988) have emphasized the need to connect and communicate the two areas (Vakkari, 1999). In order to approximate these approaches, a view based on the presentation of more interactive and humane systems was formed, and finally attempts were made to propose more holistic models and to create a symmetric look at the system-user interaction, which does not seem to be a complete success in this area (Fidel, 2012). Despite efforts made to provide comprehensive models for interpreting and modeling such a process, there are two major problems in these models: 1. The position of technology and non-human is either ignored in the information interactions or is nothing

more than a tool; 2. The scope of the information interaction process is described in an abstract form and ends in a hypothetical and abstract point without any special justification.

Without getting involved in the assumptions of the mentioned approaches, and with the aim of investigating the dimensions and components of the information interaction thematic network, the present study has been conducted to provide a comprehensive model using thematic analysis without that any of the interaction components being ignored. Achieving this goal is possible through answering the following questions: Which themes constitute the thematic network of the information interaction process? What are the dimensions and characteristics of each of these themes? What are the features and characteristics of the extracted themes-based information interaction model?

Methodology

In this qualitative research, with the aim of extracting the themes that constitute the thematic network of the information interaction process, the data have been collected by conducting in-depth semi-structured individual interviews (face-to-face dialogue). The data were analyzed using thematic analysis method within the framework of Braun and Clarke's approach by means of MAXQDA2020 software. Moreover, the coding was performed with an inductive approach.

The statistical population consisted of researchers in the field of humanities and social sciences, especially those who have attended the Institute of Humanities and Cultural Studies on a daily basis during this research and spent at least 10 hours per week in its libraries. The interviewed members were selected by means of the targeted sampling. Theoretical saturation was considered as the endpoint of sampling and data collecting. Finally, a number of 18 individuals were interviewed.

Triangulation is one of the criteria for achieving credibility (Nowell, L. S. et al., 2017) which can be implemented at the collection and analysis steps. In the present research, this technique was used at the data analysis step. This means that in order to reduce the bias possibility, after coding and naming the themes, they were re-examined by the interviewees as much as possible and their opinions were re-applied as well. Such a process made the codes and themes more compliant with the mental concepts of the interviewees.

Research findings

In order to identify the constituent themes of the thematic network of information interaction process and its dimensions, the data obtained from the interviews were explored and coded at the sentence level and, if necessary, a higher semantic unit. A number of 126 codes were extracted based on the overlap and 120 without it. Moreover, their frequency was estimated as 1284 codes (Table 1). In this paper, due to limitations, only 2 sample codes are listed in Table 1 together with the evidence.

Table 1 The sample codes together with textual evidence

Codes	Frequency	Textual evidence
Orientation by the human factor	63	“It was mostly people’s opinions, but I was also important” (Interviewee No. 15).
The role of infrastructure and technology in the research process and power	6	“I have many ideas ..., unfortunately, since the information resources are limited and information tools ...” (Interviewee No. 12).

The coding and themes constructing proceeded by following the steps in the Braun and Clark framework, including familiarity with the text, creating codes, identifying themes, drawing the thematic network, analyzing the network of themes and compiling a report (Braun & Clarke, 2012). Re-investigation of the data analysis and triangulation with the help of interviewees, led to some changes in the number of codes and themes. In summary, according to the developments of these steps, the primary codes were reduced from 126 to 120 codes upon reinvestigation. In addition, the number of basic and organizing themes were reduced from 67 to 58 and from 31 to 23, respectively. Since the data analysis was performed based on an inductive approach, the extracted themes were defined only from the perspective of the available data.

Table 2 presents an example of how global themes are formed in the interview analysis. At this step, in addition to the global themes, three fundamental elements of the internal, external and technological contexts were also identified.

Table 2 An example of the formation of five global themes

Codes	Frequency	Basic themes	Frequency	Organizing themes	Frequency	Global themes	Row	Context
Effect of the subject area on the research process	30	Effects of the thematic type and scope	32	Effect of type and origin	203	Consolidation	4	
Effects of the origin of the idea and the problem on the research type	2	Effects of the origin of the idea and the problem						

A number of 5 global themes were extracted from the data analysis (Figure 1) which are described in the following.

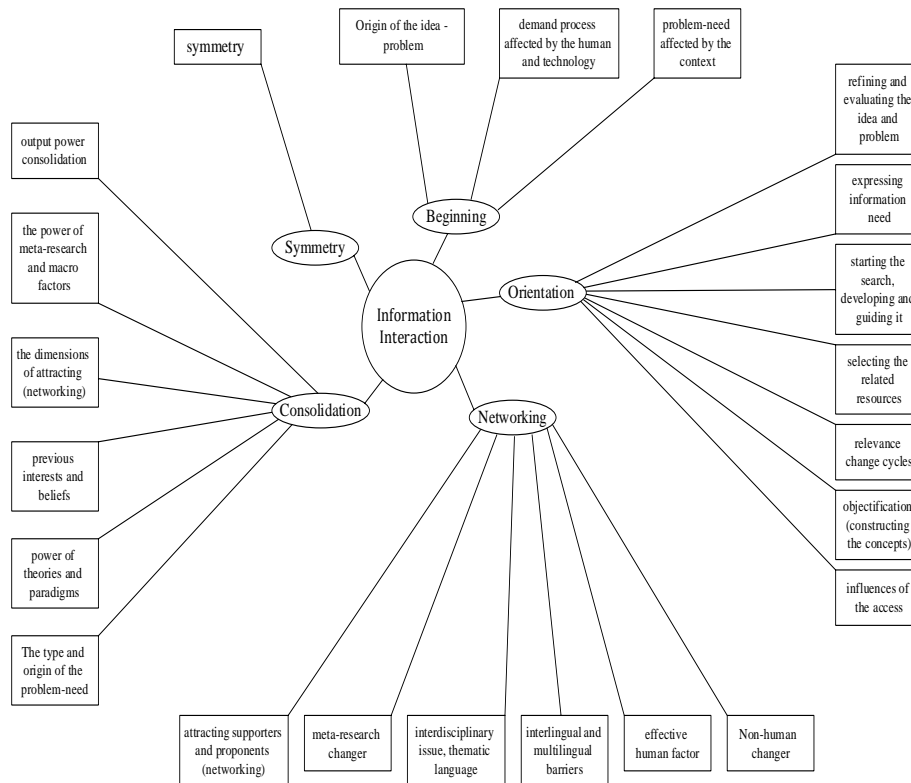


Figure 1 Thematic network of the information interaction formation

Beginning

Of the total primary codes extracted from the interviews, 29 ones with a frequency of 384 were associated with the beginning process. This global theme consists of three organizing ones, including the origin of the idea and the problem, demand process affected by the human and technology, problem and need affected by the context.

The interviewees have classified the origin and source of the ideas and information problem into several categories, ranging from vague ideas or issues to clear ones as:

“...There are things in my mind that are moving and sometimes they involve us very much in a very vague way. We know something but we do not know how to express it because it is ambiguous and we need to find the language of its expression. Sometimes you come to a conclusion very quickly... we can find a way or words that can clarify that ambiguity... or the vague thing that has formed in the mind using right tools which is sometimes found very early and sometimes takes three to four years to find the means of its expression...” (Interviewee No. 3).

They distinguished the origin and source of the specific or semi-ambiguous issues and ideas which are the basis of information needs and beginning of the information interactions in several dimensions, how they occur and emerge, factors that strengthen, weaken, change or eliminate it, as well as its contexts. The two main origins of the need were considered to be the “internal and external ones.

The internal origin included the “lived experience, priori knowledge, dormant research interests and need-making”, while the external one included the “compelling to present ideas, providing the potential to pursue old interests, receiving ideas from others and similar items”.

In previous researches, the origin of information interactions has been attributed to factors such as information gap, tacit knowledge, task, etc., which are compatible with the present results. In the following, in order to avoid redundancy and increase the article volume, only a limited amount of data from each part of the analysis will be quoted:

Priori knowledge: *“...Basically, it is an inner demand that exists in your mind, which is related to your priori*

knowledge causing that mental concern ...” (Interviewee No. 9).

Interest and desire: “*...After defending my doctoral dissertation and my mind was relived, I pursued this concern myself and I am still writing it in the form of an internal research plan of the institute...*” (Interviewee No. 3).

Need and issue affected by the context: Various contexts and platforms are involved in the occurrence of information need and issue. Its span ranges from the creativity to the task orientation and compulsion as below:

The contexts of creativity, conscientiousness, compulsion, inner interest and desire, social affair, and the “other” in codifying the idea and information needs.

The need process influenced by human-technology: Human factors, technology and tools were involved in preferring or discarding an idea or information issue. The interviewees have referred to the place of technology and tools in information interactions as a factor in determining its trend, which was seldom observed in other studies (except that of Allen, Karanasios & Slavova, 2011):

“Actually ... they were both human and technology factors. In order to perceive the generalities which came to my mind, I first had to find a few articles on the Internet and in databases, read them conceptually and took some advice as well” (Interviewee No. 8).

Orientation

The orientation process, as one of the 5 global themes of the present research, consisted of 34 primary codes with a frequency of 243 and includes 7 organizing themes, including the refining and evaluating the idea, problem and need, expressing the information need, starting the search, expansion and guiding it, reviewing the results and selecting the related resources, relevance change cycles, objectification by constructing the concepts and dimensions and influences of the data-information access.

The orientation is a complex process affected by the beginning process and influences the networking and consolidation processes. In

addition, the choices and interactions associated with this step can lead to the continuation or suspension of other interaction steps. The impacts refer to the nonlinear type together with referential cycles.

The orientation process consists of a variety of actions and decisions, from abstract and subjective cases such as performance cost evaluation to completely objective and practical ones of exploring, studying and investigating the received resources:

Refinement and evaluation of the idea, problem and need: In this section, it has been attempted to foster and enhance the idea-problem through multiple refinements and evaluate it based on the factors of feasibility and implementation, its potential, novelty and lack of stereotypes, which affect the satisfaction, inner, psychological and emotional feelings in the process of information interactions.

Ability to implement: *“... If no tools and infrastructure are needed, I will postpone it until it is possible”* (Interviewee No. 4).

The novelty of the problem-idea: *“Talking to the professors and based on my own thoughts, that the subject is novel and leads to good results, more can be done with it ... and this would be an incentive”* (Interviewee No. 18).

Expressing the information need: The interviewees considered expressing the need at two levels: turning the idea into an information need and the levels of expressing it. Any idea that passes through the refinement and evaluation step, can be expressed within the framework of information need. However, the ideas that reach the demand step are not always expressible in an easy and clear way:

“There was an old concern maneuvering in my mind for ten years and I did not know how to express it ...” (Interviewee No. 3).

Starting to explore, expanding and directing it is an objective and practical manifestation of the need for information. In this research, the search consists of three basic themes: starting the search, reviewing and improving it, as well as the citation tracking and chain building. During this procedure, various activities are performed, such as referring to the searchable resources, expanding the search with different keywords, expanding the search scope (infrastructure-type)

and discovering the relevant resources by means of the references and chains.

Some activities are conducted in order to expand the domain and some to deepen and increase the concentration (for example, expanding the search with different keywords and expanding the search scope -infrastructure-type- to develop and tracking the citations chain and references to deepen and increase the accuracy).

Search expansion: *“I usually search the web and download relevant articles with different keywords and read”* (Interviewee No. 4).

Guiding and targeting the search by following the resources chain and reviewing citations: *“I was using their citations, their list of references, and so on, these were my guides”* (Interviewee No. 2).

Reviewing the results and selecting the relevant resources, occur while exploring or searching and at the end of each corresponding session. Such a process is a continuous cycle and continues until the last information interaction step (output presentation). This process also consists of 4 basic themes of reviewing the results, refining the results and determining the relevant resources, selecting from the relevant resources as well as the impact of the resource context on its selection. The data indicated that the fourth theme affects the previous 3 processes.

Reviewing and refining the results and identifying the relevant resources: *“It does not matter to me that I read all the articles, reading the abstracts tells me whether it is useful or not”* (Interviewee No. 4).

Relevance change Cycles: given that the activities in information interactions are cyclic and repetitive, the judgments and choices associated with the previous steps are not rigid and fixed structures, but can be reviewed and judged at each step. Thus, a relevance change can occur in both human and non-human information resources. This process was identified based on two basic themes of certainty-uncertainty cycles and relevance change based on the scientific or meta-scientific criteria.

“Finally, anything you write has flaws. I also discovered these shortcomings during the defense form the

referee's comments mentioning that this is not very perfect either" (Interviewee No. 15).

What goes on in the certainty-uncertainty cycles and relevance examination according to scientific criteria includes periods of confidence and relief, followed by periods of confusion and even despair:

"When I was writing the basics, I just wanted to translate things from Latin resources that are relevant to my work into Persian. However, once I got into modeling and data analysis, I had problems until turning the data into a real model which could lead to the results ... Yes, I had some despair and regret at those steps" (Interviewee No. 1).

The relevance change can be the result of relevance judgments according to the scientific criteria, or it can be the result of unscientific factors: *"I was supposing that the discussion of the semiotic method, for example, could be a method of expressing this concern and scientific discussion. I focused on it for a few months and found it insufficient for what I wanted to do"* (Interviewee No. 3).

Or meta-research and meta-scientific: *"When this label exists, the citation to those works is considered unconventional or is not considered valuable at all"* (Interviewee No. 4).

Access to the data-information, is a multifaceted issue that is either influenced by other processes in information interactions and meta-research also affects other processes in it. It also consisted of three organizing themes of the use of available resources, impact of access on the research process and meta research-context issues in the access and process speed.

Using available resources: *"The easier it is to access the authentic sources, the more likely I use them. Sometimes, there was a good and authentic book but I did not have access to, I was disappointed...., if I could access*

it, my work would have weighed more” (Interviewee No. 8)

Mandatory choices due to the type of access: “I want to say that I tried as much as I could to deduce what I think it should be from the electronic resources and find book and print resources. if it were not for that, the work would not have progressed” (Interviewee No. 9).

Networking

The aim of networking in this study is to create links and coordination with various human, technology and infrastructure factors, to be able to benefit from them in promoting the information interactions. The networks around information interaction are considered as basis for strengthening and empowering it. These networks, which are in favor and supporters of information interaction, have different dimensions and characteristics and can transform the interaction processes.

Creating networks is a multifaceted issue which is disrupted by internal and external barriers, including interlingual-multilingual and interdisciplinary issues, which sometimes turn into anti-network of the proponents. Of the total codes, a number of 32 ones with a frequency of 435 replications were associated with the networking process. This global theme included 6 organizing themes of:

Non-human (tool, technology, infrastructure) changer, effective human factor, interlingual and multilingual barriers, interdisciplinary issue and thematic language, meta-research changer, trying to attract supporters and proponents (networking).

In the macro view of the organizing themes of networking, the interlingual and multilingual, interdisciplinary and thematic language and also meta-research changer themes were somewhat disruptive of the proponents’ network, while the non-human and human factors had a dual function.

Non-human changer: The non-human refers to the tools, technology and infrastructure. Reviewing the conducted researches in the field of information with dominant paradigmatic approaches, no cases were found concerning with the non-human place in the form of network and connected context. However, Tabak’s researches (Tabak & Willson, 2012; Tabak, 2015) took such a view, which is based on the

actor-network theory approach that's different from the paradigm approach of the current study.

The non-human changer consisted of six basic themes, including the utilization of tools and technology, functioning of the tools in the interaction process, effect of tools and infrastructure on the behavioral pattern, functioning of the tools in the speed and power of interactions and impact of the ability to use technology in the service of meta-research, the last two of which affect the previous four items.

"I got the data I needed from databases which are common in economics on the Internet, such as the World Bank and International Monetary Fund" (Interviewee No.18).

Evidence confirms the significant role of tools and technology in the process of interacting with information. They acknowledged that what they did with the tools and technology in the information interactions, would be impossible or disrupted and transformed without them:

"Without Alexa, we would have had to choose other sampling methods and it would have taken even longer, and the situation could have definitely changed..." (Interviewee No. 7).

Effective human factor: In addition to the tools which can enhance the strength, speed and accuracy of the information interaction process and enrich the network, human factor is another one with a significant position. The human factor included a wide range of the members of society such as friends, professors, managers, etc. The human factor had different roles from proponent and material-spiritual incentive to opponent. Generally, the more they agree with an information interaction and its output, the greater its power will be.

Interlingual and multilingual: The multilingualism issue is a more serious one in specialized areas. In some cases, the issue of interlingually and multilingualism was one of the networking failures factors:

"The main obstacle in my way was access to English resources ... some of them were also in German or French"

that I could not read. This was, in fact, more of an obstacle to my work” (Interviewee No. 2).

Interdisciplinary and thematic language: This organizing theme consisted of 3 basic themes including interdisciplinary and scope dispersion. Interdisciplinarity, while leading to the expansion of scopes and benefiting from the potential of different disciplines to solve the problem, can equally hinder the flow of information interactions, or make it superficial. For example, lack of knowledge in new areas hindered interactions and disrupted networking:

“It often happens that I become interested in a subject, read it and suddenly think that it is beyond my literacy” (Interviewee No. 17).

Meta-research changer consisted of three basic themes, including the effect of time pressure on search-research, role of environmental, social, political and cognitive factors in process selection and orientation, as well as the effect of benefits, losses and incentives on the process. The effective meta-research on the information interactions included the following:

Lack of time: *“Regarding the subject I chose ... the issues of cost and time were really important to me. If I wanted to work on the concepts, it would take a lot of time”* (Interviewee No. 2).

Attracting proponents and companions: The process of attracting proponents, which affects the consolidation step, is influenced by the research and meta-research cases. During the process, the more obstacles can be overcome and the more existing contexts and human-non-human factors can be utilized, the more successful the networking will be. This theme included, trying to attract supporters (human-non-human) and proponents, as well as their position in power relations. During the process of attracting supporters, some actions were performed such as current and past movement cycles, direct efforts were made to attract proponents through creating a common context and using tools and technology to increase the number of companions. This process was influenced by factors such as the output power of interactions, as well as the power, influence, and socio-political relations of the research team.

Attracting the proponents (networking) with current and past movement cycles and connecting them:

“...We had a dialogue with a several veterans who had experienced him in various positions ...” (Interviewee No. 12).

Consolidation:

The global theme of consolidation consisted of 24 primary codes with a frequency of 203 replications, in the heart of which, there were six organizing themes of:

The type and origin of the problem, power of theories and paradigms, previous interests and beliefs, the dimensions of attracting proponents and companions (networking), the power of meta-research and macro factors and factors involved in the output power consolidation.

This section was influenced by various dimensions and factors of human, non-human, technology and other macro-ones. At this step, the final output of information interactions must have sufficient strength, coherence and appropriate structure against the weakening factors. The closer it is to the acceptable and public beliefs and structures, the easier it is to establish its position.

Extending information interactions to the output presentation step is important because, in the conventional approaches of the information seeking and information behavior process only one slice is represented; After selecting the resource and determining the amount of relevance, it is as if the work is over and there is no judgment or review of the others. In the conventional approaches and models, despite the existence of relevance assessment and judgment cycles, the interaction with the system is incompletely proposed. The investigation of the existing models did not reveal the reason for leaving all interactions at an abstract hypothetical endpoint.

What is really happening and the present interviews also confirm it, is the continuation of the information interaction such as evaluation, correction and judgment of relevance until the output presentation step in the forms of writing, speech, etc. The last step in the formal form is to accept the output after judging or reviewing it. What is necessary for the first steps of information finding, is also required for the steps of applying the referee's comments, responding to the criticisms and the like:

“Everything you write has flaws. I also understood these shortcomings during the defense according to the referee’s comments, mentioning that this is not very perfect either and has some shortcomings” (Interviewee No. 15).

Therefore, in order to respond to the criticisms and eliminate the existing flaws, information interactions proceed as in the first steps. Hence, the information interaction process formed around a problem ends only with failure and facing an obstacle, or generating a consolidated output (acceptable which does not require changes). More clearly, the beginning of information interactions is an internal problem or external compulsion and similar cases, and what completes the process of such interactions is the attainment of consolidation (stable output).

The strength of theories and paradigms is one of the factors affecting the fate and acceptability (consolidation) of the output of information interactions. Theories and paradigms have a dual function on the output, they can put pressure on the process and shape of the outputs that contradicts them, and subject them to many criticisms and pressures, resulting in flowing many information interactions by proponents and opponents and its producers:

“There was a panel in the group where I presented the result and it was strongly opposed ... that I am violating everything. We had to continue the conversation for two more sessions so that I could convince them to some extent, for each of which, I had to gather new evidence and resources, and even changed the way of expressing in some places...” (Interviewee No. 7).

The dimensions of attracting proponents and companions (networking): Here, the effect of networking on the quality and form of the information interactions’ output is considered. This theme is based upon two basic themes of trying to attract the supporters of the scientific and unscientific fields and the effect of scientific-unscientific networking on the output strength. In the first part, observing scientific structures in writing and reporting the finding and trying to satisfy others in interpreting the results, was discussed, while

the second part dealt with the effect of template constraints on the research process, effect of trying to persuade others on the output strength, as well as determining the output value and strength by unscientific factors and imposition of unscientific issues on the validity of the research output by the interviewees.

Attracting the proponents both in the scientific and unscientific fields: *“If the narration is consistent and framed, the scientific community will definitely accept it”* (Interviewee No. 2).

Among the harms in scientific works, due to trying to attract supporters or retain existing proponents, one can mention the bias or self-censorship and the like, which have adverse effects on the information interactions:

“It is argued that since our work is scientific, we must have output, our articles have to be published, we must have a good scientific resume and give lecture, and we have to move a series of things towards the dominant view in the society, and so on, which is compulsory” (Interviewee No. 9).

The power of meta-research and macro factors, included issues such as the role of fear and commitment in self-censorship in order to provide or retell information, as well as the influences of anti-research behaviors and norms and the power of social affairs in research being discussed under two major categories of macro-research factors and social affairs.

Among the factors of self-censorship and truncating information interactions were fear and commitment in providing and retrieving information, which can be due to the defective structures of access to information, fear of unintended consequences, or scientific and moral obligations. The first item is due to the unscientific factors imposed on the scientific output that weaken it:

“I did not include the basic data and statistics in my dissertation, that is, the information that I ... said ... I do not release the basic data and statistics information. That is, the dissertation lacks the basic data ... due to the secrecy and the like” (Interviewee No. 11).

The anti-research behaviors and norms can prevent or stop the information interactions:

“If I got to a point where they said no and insisted a lot, I would certainly keep that research to myself and carry it out in a more appropriate space at another time. I would not spend in vain” (Interviewee No. 11).

Symmetry:

The theme of symmetry implies the power of effectivity and almost equal importance of the factors involved in the information interactions at the same level. It was employed to reflect the importance of technology context, external supports and some neglected items in the information seeking and information behavior studies. However, it was proposed regardless of the existing approaches in terms of the technology agency or tool. The considered symmetry is the basis for explaining the function and importance of the various internal, external and technology-tools contexts. In total, 1 primary code with a frequency of 28 replications was assigned to the symmetry.

Several cases were proposed about the importance of each context and their position. From the perspective of some interviewees, the lack of proper infrastructure along with internal and external pressures may disrupt the information interactions. Furthermore, the existence of appropriate tools and infrastructure along with human and non-human factors can provide a convenient platform for promoting the information interactions:

“The internet was very important to me when my topic was chosen and I needed to write my proposal. However, the role of my supervisor was more important at the previous step” (Interviewee No. 16).

They found it difficult or impossible to rank their importance:

“No, it is impossible ... in general, it is not possible to determine whether the tools have priority, or books or individuals” (Interviewee No. 2).

Symmetric information interaction model:

The analysis of the data obtained through the interviews indicated that the process of information interactions consists of 5 global themes, 4 of which are the beginning, orientation, networking and consolidation account for the core processes of interactions, and all actions and movements in information interactions can be interpreted through them. The activities of each process affect the totality of information interaction. Moreover, the movement direction of these activities is not linear and cumulative, and at each step the process may fail, stop, deviate, or need to be reviewed and referred to the previous steps and repeated.

All four core processes can be interpreted and explained under the influence of a symmetric approach. That is, at each step, the four processes or part of them take place in three layers of the inner, outer and technology-tool contexts (Figure 2).

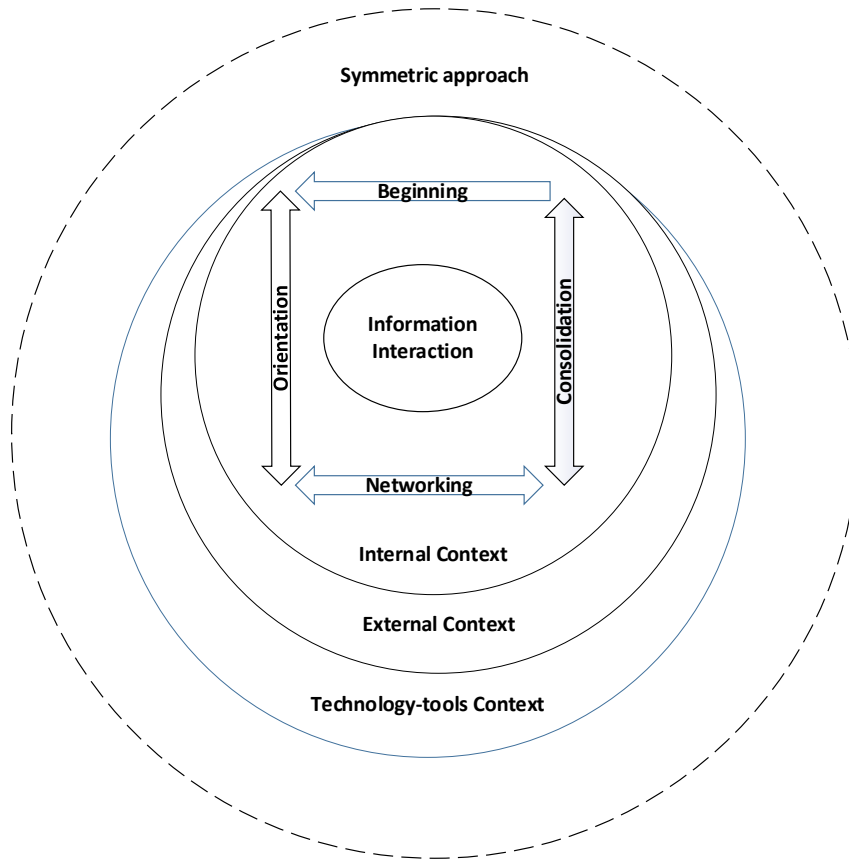


Figure 2. Symmetric model of information interactions

Conclusion:

According to this research, the information interaction is not merely limited to the information Seeking. This nonlinear interaction is a repetitive process that continues from the emergence or acquisition of an idea to the generation of a consolidated text or output. Despite the resemblance of the proposed model to Foster’s nonlinear one (Foster, 2004) in some aspects, the inclusion and definition of the core processes are significantly different. For example, what is considered in the consolidation process of the present model, considerably differ from this concept in the Foster’s model. Also in this model, the interpretation of agency of human and non-human, also internal, external and technology-tools contexts were evaluated as symmetric (with a little tolerance). However, such a symmetry agency is absent

in Foster's(2003) model and other models in this field; Because they do not give a specific agency to non-humans. In this model, the internal and cognitive contexts of the Foster's model were placed in a single layer and the technology-tool context was added to them.

The symmetric model of information interaction has certain defaults and dimensions:

- The scientific work is a nonlinear as well as reproducible and modifiable process. Hence, the information interaction that take place during it, is a nonlinear process which continues from the idea and problem emergence step to the final text preparation phase as the output (In any format, which has passed judgment and consolidated).

- In the scientific works, the processes existing in the information interactions flow in parallel, and the modification and change at each step or in its dimensions affect the whole.

- The context is effective in three layers and technology-tool context falls at the same level of the internal and external one.

- The symmetry in effectivity, flows in four core processes.

Symmetry: The symmetry considered in this model based on the David Bloor's symmetry principle proposed in the third principle of "Strong Program" (Bloor, 1976; G. Galassi, 2019) and social constructivists (Rabbani and Maher, 2013), of course with the addition of the non-human factor, which has not yet reached the symmetry step in Actor network theory which called "generalized symmetry" (Callon & Latour, 1992).

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