Qualitative Methods in Information Research: A Study of Research Creativity

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Abstract: The paper is aimed at review of qualitative methods in information research. Theoretical sources of the qualitative research style are identified, using methodologies applied from psychology, social psychology and phenomenography. Analytical procedures in qualitative methods are explained, namely the content analyses, interpretations, concept mapping. Examples of our qualitative studies of relevance, information ecology and information horizons mapping are mentioned. Findings of a recent qualitative study of information behavior of researchers with respect to research creativity are mentioned in detail. The methodology of semi-structured interviews with 19 selected top researchers in Slovakia was applied. Research creativity is determined and visualized by a conceptual map representing the collective discourse of researchers. Perception of research creativity includes innovations, bird´s-eye view, new ideas, overlaps. Differences in domains are considered (interpretations, problem solving, discovery). Support of creativity as part of ecological information interactions is proposed with the emphasis on methodological creativity. Significance of the qualitative style of research in information science is summarized, namely understanding contexts, human experience, intuition, emotions and development of new methodologies.

1. Introduction

Qualitative and quantitative methods in information research are main pillars and tools for conceptualization, design and management of research process aimed at understanding information interactions between people and information environment. The qualitative paradigm of research is framed

especially by those types of questions and problems which are aimed at understanding of context of information behaviour, practices and experience. In Information science qualitative methods are typically applied in human information behaviour and information literacy studies. Theoretical sources of qualitative approaches are applied from psychological and social sciences. As examples we can mention action research, observation, case studies, surveys, historical analyses, ethnography, ecological research, but also phenomenology, phenomenography, interpretative and narrative methods; such as discourse analysis and visualization methods including concept mapping.

Consideration of contexts, either educational or workplace and community are typical drivers of qualitative research. Selected popular theoretical methodological constructs which are applied in qualitative research include constructivism, social constructionism, or symbolic interactionism. Many authors presented qualitative research methods in information science (e.g. Pickard 2013, Given 2008, Cisek 2014).

In this paper we present a review of qualitative methods in information science with respect to information behaviour and information literacy. We also reflect on examples of our own qualitative studies of relevance, information ecology and information horizons mapping in the academic information environment. In further sections we report on our recent qualitative study of researchers in Slovakia with regard to attitudes towards research creativity based on content analyses and concept mapping. We also mention our experience with concept mapping and propose ecological information interactions for research creativity support.

2. Theoretical Sources of Qualitative Methods in Information Science

The objectives of qualitative research methods are identification of causes of selected phenomena, motivations or deeper contexts of information practices and behaviour of people. Information practices can be determined as ways of how people engage with information and are shaped by social practices (Olsson, Lloyd 2017). The concept of information practices arises from practice and connects with cognitive and social factors of information use (Limberg 2017). In qualitative research information practices can be represented by various social and cultural representations of objects, situations and contexts. Information objects can be organized in social, discursive and material forms. Individual manifestations of phenomena or behaviour are often involved in building the "grounded theory" by Glaser and Strauss (1979). In practice of the research qualitative methods are usually combined in mixed methods. Typical qualitative research would ask the questions "why" and "in which context". Differences between qualitative and quantitative research are in general style of the research. In qualitative research a researcher assumes that the objects can be constructed and interpreted. That is why constructivism is one of popular methodologies in qualitative research, especially in constructing knowledge and

information. Frequently used methods are observation, diagnostic processes, surveys and various types of interviews, including focus groups and Delphi methods. Since these methods are characterized by deeper understanding of events and contexts, they apply in-depth content analyses which discover tacit knowledge, new categories or patterns. Results can be represented by descriptions, interpretations, narratives, stories. In development of systems qualitative methods include usability testing, experiments and heuristic evaluation. Limitations of qualitative methods include subjectivity of interpretations, selection of participants and research ethics. Often the researcher is part of the investigated community.

Simply put, qualitative studies concentrate on those objects and phenomena that cannot be measured properly. That is why this type of research applies deeper analyses of cognitive and affective processes which can be manifested in behaviour, practices, activities, experience, but also attitudes, interests or motivations of human beings. Representations of finding based on multiple data analyses can include narratives, life-histories, discourse analyses. Manifestations of different phenomena were studied especially in the conceptual framework of phenomenology in information behaviour (Wilson 2002). Researchers in phenomenology of information behaviour can ask the following questions: How is the state of knowledge and information need manifested? Which differences exist in perception of phenomena between individuals and communities? Which roles are played by individual actors in situations of information behaviour?

In information behaviour research and information literacy the concept of phenomenography is often applied. It means an original methodology developed by F. Márton focused on differences in perception of objects and phenomena by communities and also n connections between two investigated phenomena, e.g. information seeking and learning. This methodology lead to original research works by Louise Limberg and Christine Bruce. New knowledge and views on relations between information seeking and learning and experience of people in information environments formed an alternative paradigm of information literacy research (Steinerová 2016).

Other interesting examples of qualitative studies in information science are works by T. Anderson (2010, 2013). Studies of relevance as a process and in context contribute to understanding the creative part of scholarly information activities. They can shed light on information interactions with new insights into scholarly communication and experience. Rich data acquired by ethnographic or phenomenographic studies usually need much in-depth content and conceptual analyses. Qualitative data analysis (QDA) can be supported by qualitative analytical software and visualized by digital tools (e.g. Atlas.ti, QSR NUD*IST). New perspectives emerge in development of new open-source systems for qualitative data analyses (e.g. R extension) which can enhance constructivism and validity of qualitative research. This line of qualitative

research methods is interesting for further development of in-context studies, including holistic perspectives on information environment, such as information ecology. The problem of knowledge representation should be considered for interpretations of inter-subjective phenomena studied by information science (such as relevance, information literacy, or information practices). In this respect it is important to emphasize conceptual modelling, topic modelling (Nikolenko et al. 2015) and concept mapping (Novak, Canas 2006, Whitworth 2014) as fruitful methodological tools for understanding cognitive contexts and situational dynamism of information practices and categories of information science. Ethics of qualitative research, especially in online environment refers to manifold aspects of internet consent, protecting participants, anonymity or confidentiality.

3.   Examples of Qualitative Studies of Relevance and Information Ecology

We applied qualitative methods in a number of our research studies focused on examination of relevance, information ecology and information behaviour of doctoral students and researchers. The studies were aimed at discovering tacit contexts of academic information environment, including values, experience and emotions. We also applied concept mapping in the study of relevance and information ecology for representing the content analyses of interviews.

The study of relevance (Steinerová 2008) was based on semi-structured interviews with 21 doctoral students in humanities and social sciences and focus groups. Based on the concept of phenomenography we tried to identify relationships between relevance assessment and user experience in information use. Content analyses and concept modelling lead to definition of relevance in digital environment supported by context, visualization, collaboration. Several concept maps modelled by C-Maps represented different types of relevancies, and several "faces" of relevance.

Another study focused on information ecology of the academic information environment. One part of the project applied 17 semi-structured interviews with information managers in three selected universities. Multiple analyses and categorization lead to several conceptual models. For example, the values of information ecology are based on common goals, motivation, interest. The final model of information ecology of the academic information environment depicts semantic, cognitive (visual) and behavioural dimensions of information environment with the use of filters, strategies and knowledge organization tools (Steinerová et al 2012).

In the following study we applied qualitative approach to research of information behaviour of doctoral students based on 19 semi-structured interviews and information horizons mapping (Steinerová 2014). We identified methodological literacy and patterns of information use, including the

interactive pattern, process pattern (information problems solving) and an evolutionary pattern (knowledge growth, learning). In conclusion, a model of ecological information interactions was presented with nested processes from project management to conceptual focus (Steinerová 2014a, Steinerová 2015).

These examples point to common benefits of the qualitative style of research in understanding complex information phenomena. With respect to methodology we noted combinations of interpretations and statistical and quantitative analyses. The system for structuring and categorization of big data can help us consider many contextual factors related to information research, such as temporal, spatial, environmental, ethical, including the factor of creativity.

4. Research Creativity: A Qualitative Study of Information Behaviour of Researchers

An interesting contribution to understanding creative processes in information sciences was presented by Bates (2016). Based on her own experience she emphasized the unpredictability of creative process, openness, knowledge of research traditions, wide and deep reading and innovative ideas. Bawden and Robinson (2012) claimed that creativity and innovations can be aided by information tools if used by the "prepared mind". Anderson (2013) proposed four strategies for support of creative literacies: plan, play, pressure, and pause. Creative information strategies with regard to information literacy were examined in our earlier work (Steinerová 2015). Research in creativity usually concentrates on creative personality, creative process and creative product. Creativity research can inform information research and provides incentives for innovations. Several studies of information creativity were conducted by our doctoral students (Kropajová 2014, Jakušová 2016). We identified creative information strategies as exploration of information environment based on new and original ideas and links between knowledge base and insight and intuition. Basic sources of creative information strategies are metaphors, analogies, intuition, emotions and empathy, but also interdisciplinary information or metaphors. In our model we proposed three basic creative information strategies, i.e. conceptual structuring (e.g. concept mapping), conceptual exploration and conceptual navigation.

Following this context we conducted a study of perceptions of research creativity with selected researchers as part of our larger project of information behaviour of researchers. The qualitative study applied semi-structured interviews with 19 selected top researchers in Slovakia, including social sciences, humanities and sciences. Characteristics of the participants of the study are in table 1.

Table 1. Characteristics of the participants of the study (19 participants)

Group	Discipline [17]	Research subjects	Gender
Humanities (8)	Archaeology; Archival Studies; Comparative Religionistics; Literary Studies; Sinology; Slovak Language – Linguistics; Systematic Philosophy (2) [7]	Aeneolith, Bronze Age; Written Culture History in Slovakia; Maya Culture; Slovak Literature; History of China; Slavic languages, Dialectology; Logics; Pragmaticism	F (0) M (8)
Social Sciences (4)	Ethnology; Economics, Statistics; Politology; Sociology [4]	Folk traditions, social anthropology; Megatrends, prognostics; Comparative politology, European integration; Social policy	F (4) M (0)
Sciences (5)	Astronomy, Astrophysics; Macromolecular Chemistry; Molecular Biology; Neurophysiology; Nuclear Physics [5]	Observational astronomy; Polymers; Genetics; Autism; Space Sciences	F (1) M (4)
Technical Sciences (2)	Computer Science (2) [1]	Information Systems; Software engineering	F (1) M (1)

Combinations of content analyses and concept mapping were used for analyses. The following basic components of the information behaviour of researchers with respect to digital scholarship were identified: the research process, the information process, the information infrastructures, the factors of influence. Data were coded and frequencies of derived categories were interpreted. Deeper semantic analyses have been applied, including concept mapping. The structure of categories was represented by a special concept map. Concept mapping can help extract key concepts, semantic representations of main topics, develop categories, visualize contexts and semantic relations. In line with similar research projects (Novak and Cañas 2006, Kinchin et al. 2010, Whitworth 2015) we visualized content in more than 20 concept maps. Initial results identified common patterns and disciplinary differences in perceptions of knowledge infrastructure. Common patterns revealed common critical analytical information practices (information fluency). Practical experience and expertise is manifested in use of authoritative information sources and personal international expert networks. Open science factors were identified, especially promotion of results and open access.

5. Research Creativity: Findings and the Concept Map

Findings regarding research creativity point to attitudes of researchers to creative work. Characteristics of research creativity were identified, namely innovations, bird´s-eye view, new ideas, and interdisciplinary overlaps. Creative information strategies were confirmed as the basic condition of the research process based on existing knowledge and longitudinal interest, including new inspiration and data. Differences between humanities and social sciences and sciences include focus on interpretations on one hand and the problem solving and discovery on the other hand. The collective discourse of researchers is represented by the conceptual map Research Creativity (fig. 1).
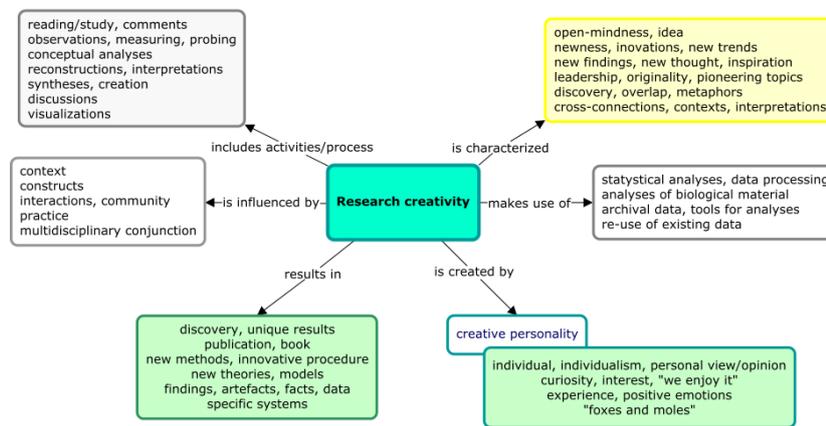

Fig. 1   Research Creativity – concept map

The map represents main characteristics of research creativity, creative personality, creative process, creative results (products) and contextual factors. The question was focused on attitudes towards creativity in research work. Researchers named and identified main components of creativity in their research work, namely creative personality, creative process, creative product, and contexts – factors of influence, tools and techniques in research activities. Characteristics of the research creativity are determined as open-mind, newness, originality and innovations. Creative personality and internal motivation guide individual interpretations. Subjects emphasized experience, emotions, collective collaboration, community, constructs, and practise.

Research creativity is also connected with values of the research process which were perceived at individual and social levels. Values are often embedded in everyday information practices and expertise. The common denominator of researchers´ values is deep motivation in discovery of new perspectives,

problem solving, or knowing the unknown. Researchers interpret values in relation to creativity and fascination by knowledge and service for society. The values are also interpreted as the ideal moral values – curiosity, characteristics of a moral learned scholar, learned society. Differences in interpretation of values have been noted. Practical problem solving and assistance in understanding of life are typical for sciences. In humanities and social sciences, values are determined in broader sense, such as bridging the gap in knowledge, bringing new perspectives and interpretations, including intellectual pleasure.

6. Support of Creativity – Ecological Information Interactions

Further research in research creativity could be based on main categories which were identified in the conceptual map. In practice support of creative information strategies can be derived. Better support of creative information strategies can be based on creative ecologies (Howkins 2009) as digital places and spaces with creative tools (visualization, cognitive and concept mapping and modelling). In line with ecological approaches to creativity research (Isaksen et al. 1993) we propose the concept of ecological information interactions as holistic concept to information use, awareness of contexts and digital information environments. Based on our study, the concept of ecological information interactions (Steinerová 2014) is composed of methodological factors, expertise, and open science factors. The concept of open science and promotion of science could also contribute to support of research creativity. In creative information strategies researchers use information analytical tools (data analytics, pattern recognition). Digital spaces can open spaces for research creativity, including digital publishing, open peer-review, participation in scholarly social networks, data management. For guidance in research work such ecological features of systems and tools as conceptual infrastructures, multiple knowledge representations, pattern recognition, analogies, associations, metaphors, visualization, knowledge discovery, clustering, and collaboration should be designed. Special attention should be paid to methodological creativity, information styles of researchers and research information literacy (Steinerová 2013, 2016). Research creativity is embedded in the research process and contexts of cultures of disciplines, types of research questions and personality of researchers. Information environment can add value, but also inhibit research creativity. Research creativity is also connected with the use of big data, discoveries, practical products or patents. Internal motivation, interest, quest for understanding and curiosity are main factors for strengthening and further examination of research creativity from the perspective of information ecology.

7. Conclusions

Qualitative paradigm of information research can be an important source of development of new knowledge. In information research qualitative studies discover contexts of information needs, information behaviour and information interactions. New contexts can be also identified in collaborative information behaviour and information sharing. It is important to note that traditional

qualitative methods can be supported by digital tools and systems, especially eye-tracking, think-aloud techniques, value sensitive design and visualization techniques. With respect to scholarly communication there is still a promising line of domain analytical approach to scholars´ information practices (Talja 2005), domain analysis (Hjørland, Albrechtsen 1995) and socio-cultural approaches (Sundin, Johanisson 2012).

Deeper holistic perspectives are needed in information behaviour and information literacy research. For example, the alternative paradigm of information literacy (Steinerová 2016a) lead to re-conceptualization of the concept of information literacy as life-long experience, informed learning, information fluency, building information landscapes and (guided) inquiry process. If we want to understand motivation, cognitive information processing or values of information ethics, we need to apply mostly qualitative methods. Emergent models based on implicit contexts can help develop ecological features of digital systems which can approach human information needs and information style patterns, emotions in information use.

In this paper we analysed our qualitative studies in information behaviour and identified main categories of research creativity. We also proposed the concept of information ecology for further qualitative research of complexity of relationships among people, information and technologies. Ecological information interactions can help understand such characteristics of information activity as adaptations, collaboration, co-evolution, competition, in-context perspectives. Creative engagement in information processing in context of research and science can help not only understand the question of research creativity, but also support researchers in open and digital science.

Fundamental principles of ethnographic inquiry including social actions and cultural representations have strong potential for creative insights into information interactions research. Benefits of qualitative methods include holistic views, understanding deep contexts and new perspectives. Limitations of qualitative methods are subjectivism in interpretations and validity and the assessment of rigor of research. Qualitative researchers have already developed many paths and categories for the assessment of quality of qualitative research, e.g. worthy topic, rich rigor, requisite variety, sincerity, methodological transparency, credibility (Walby, Luscombe 2016).

Significant findings in research are often results of new, creative and emergent methodologies which are based both on qualitative and quantitative methods. The promise of ecological information interactions for support of research creativity is the holistic perspective connecting individual, collaborative and community levels of emerging creative communities and economy in digital spaces.

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