

Week 4: Qualitative research methods and data collection approaches

In this section of the course, we cover the following qualitative research methods.

- Ethnomethodology
- Narrative research
- Phenomenography
- Case study research
- Grounded theory

Additionally, there will be a short introduction to four data collection methods in qualitative research.

- Interviews
- Direct observation
- Log files
- Content analysis (has both qualitative and quantitative uses)

Questionnaires are also used often in qualitative research (especially open-ended questions), but they have already been discussed previously in the course.

Introduction to five qualitative research methods

1. Ethnomethodology

According to ten Have (2004), *ethnomethodology* research originated from social sciences. He continues by explaining that the “*ethnomethodologist prefer to study how, by the use of which [various] procedures and methods, any particular ‘world’ is produced and perceived*”. Randolph (2007), uses the term *ethnography* to refer to similar type of research. The aim of ethnographer is to interpret and describe how a certain cultural community behaves and how the principles and values of the community affect the behavior of individuals (Randolph, 2007). According to Joy et al. (n.d.), terms cultural anthropology and naturalistic inquiry are also used to describe basically a similar research approach: a study of **sociocultural settings and phenomena**.

Ethnographical research is used to investigate various aspects of cultural communities, such as **norms, values and practices of a targeted research population** (Randolph, 2007). Ethnographer usually spends lot of time in the field making observations and interviewing members of the community. The challenge is that the researcher is expected to acquire deep knowledge about the

community under study, while at the same time take distance in order to make objective observations. Additionally, a blend of various data collection methods can be used, e.g. historical data, document analysis and interviews to support the field notes. Ethnographic research is often not concerned about individuals and their subjective opinions and behavior, but activities of the whole community (ten Have, 2004).

Example of ethnography in computer science

Millen, D. R. (2000). Rapid ethnography: time deepening strategies for HCI field research. In Proceedings of the 3rd Conference on Designing interactive Systems: Processes, Practices, Methods, and Techniques (New York City, New York, United States, August 17 - 19, 2000). D. Boyarski and W. A. Kellogg, Eds. DIS '00. ACM, New York, NY, 280-286. DOI=<http://doi.acm.org/10.1145/347642.347763>

“Field research methods are useful in the many aspects of Human-Computer Interaction research, **including gathering user requirements, understanding and developing user models, and new product evaluation and iterative design.** Due to increasingly short product realization cycles, there has been growing interests in more time efficient methods, including rapid prototyping methods and various usability inspection techniques. This paper will introduce **“rapid ethnography,” which is a collection of field methods intended to provide a reasonable understanding of users and their activities given significant time pressures and limited time in the field.** The core elements include limiting or constraining the research focus and scope, using key informants, capturing rich field data by using multiple observers and interactive observation techniques, and collaborative qualitative data analysis. A short case study illustrating the important characteristics of rapid ethnography will also be presented.”

Table 1 summarise the pros and cons of ethnomethodology.

Table 1: Strengths and weaknesses of ethnomethodology

Strengths	Weaknesses
+ ability to examine complex cultural phenomena	- ethnomethodology’s status as a science.
+ orientation towards holistic perspective and tendency to identify diverse aspects of culture	- whether to focus universal knowledge or specific knowledge
	- validity of the reports
	- needs skillful researcher and lot of time in the field

2. Narrative research

According to Randolph (2007), narrative research is the study of a single individual and his or her life experiences. In narrative research, individuals are asked to provide **stories** about their live experiences (Joy et al., n.d). The stories can reveal versatile insights about feelings, sentiments, desires, thoughts, and meanings of the person. A life story is a narrative or several narratives influenced by the cultural conventions of telling, by the audience, and by the social context (Moen, 2006). He argues that storytelling is a natural way of recounting and creating order to our experience, which starts in childhood and continues through all stages of our lives.

Moen (2006) and Andrews et al. (2004) provide four claims for using narrative research

- 1) that human beings organize their experiences of the world into narratives
- 2) concerns the multivoicedness that occurs in the narratives.
- 3) it can be applied in many fields, such as arts, humanities, science and social sciences.
- 4) can be used to investigate how people frame, remember and report their experiences, thus, allowing researchers to get an understanding of complexities of human lives and endeavors.

In narrative research, the researcher draws conclusions from the various sources related to individual's life events. Typical data sources in narrative research are (Moen 2006)

- 1) interviews
- 2) field notes
- 3) observations
- 4) documents
- 5) biographies
- 6) oral histories and story telling.
- 7) newsletters, rules, principles and pictures

Biographies are one of the most popular data collection methods in narrative research, e.g. the individuals are interviewed or they provide a written biography of their life events based on the topic of the research. Rosenthal (2004) provides the following list of suggestions for a biography

- 1) address a phase of the interviewee's life
- 2) address a single theme in the interviewee's life
- 3) address a specific situations

- 4) elicit a narration to clarify an earlier argument
- 5) address an event that is not experienced by the interviewee or the knowledge is transmitted

Rosenthal (2004) also summarises the general steps of narrative research analysis

- 1) analysis of the biographical data
- 2) text and semantic field analysis
- 3) reconstruction of the life history
- 4) microanalysis of individual text segments
- 5) contrastive comparison of biographical data and life story
- 6) development of types and contrastive comparison of several cases

Example of narrative research in computer science

Knobelsdorf, M. (2009). A Typology of CS Students' Preconditions for Learning. Proceedings of the 8th Koli Calling International Conference on Computing Education Research. Retrieved September 10, 2009 from <https://www.it.uu.se/research/publications/reports/2009-004/2009-004.pdf>

Knobelsdorf (2009) has used biographical research approach to analyze students' individual computing experiences retrospectively. The main focus of the research was to investigate students' experiences and opinions about learning, experiencing and understanding computer science. The main finding of the study was that students' computing experiences are individual and vary considerably. However, there are some common experiences, beliefs and perceptions about the subject. Based on the results of the research, the aim is to reconstruct a typology to present typical patterns among the single characteristics of students' preconditions.

3. Phenomenography

The goal of phenomenography is to **investigate individuals' level of understanding** of a lived experience or a certain phenomena (Randolph, 2007). A phenomenographical researcher analyses shared meaning of experience of a phenomenon for several individuals. A typical data collection method in phenomenography is to interview individual who have experienced the live experience or the phenomenon. According to Joy et al. (n.d.) this relatively recent methodology (in computer science) offers a humanistic and individualistic interpretation of the world. In recent year, phenomenography has gained popularity in Computer Science Education. The focus has been, for instance, to investigate how computer science students understand certain key topics in the field, such as object-oriented programming concepts.

Marton (2004) presents the following applications for phenomenography

- 1) **The experience of learning**; investigating the experience of the act of learning and problems solving. Understanding of the phenomenon of learning from learner's perspective
- 2) **Different ways of understanding the content learned**; finding critical differences on how concepts, principles and content in specific domains are understood. To find out how the development of knowledge and skills within a domain can be facilitated
- 3) **Describing conceptions of the world around us**; characterising the collective mind and encompassing the different ways people are making sense of the world

Example of a research paper

Pears, A., Berglund, A., Eckerdal, A., East, P., Kinnunen, P., Malmi, L., McCartney, R., Mostrom, J.-E., Murphy, L., Ratcliffe, M.B., Schulte, C., Simon, B., Stamouli, I. and Thomas, L. (2007). What's the problem? Teachers' experience of student learning successes and failures. In Proc. Seventh Baltic Sea Conference on Computing Education Research (Koli Calling 2007), Koli National Park, Finland. CRPIT, 88. Lister, R. and Simon, Eds. ACS. 207-211.

Abstract

This paper opens the classroom door to provide insight into factors that shape tertiary **computer science teachers' experience of** (and engagement with) student learning success and failure. This topic is explored through **phenomenographic** analysis of teacher narratives dealing with frustration and success in facilitating learning for their students. Three themes related to learning are explored which highlight different aspects of the learning situation, namely, **students, environment, and responsibility**. Using these themes as a focus reveals great diversity in the manner in which teachers experience student learning difficulties and approaches to resolving them. The results provide computer science academics with a framework within which to discuss and contrast their values and assumptions and understand their implications for teaching practice.

Examples of categories

<http://crpit.com/confpapers/CRPITV88Pears.pdf>

4. Case study research

A case study research involves **a detailed analysis of a single object** or phenomena such as a person, a system, an organization, a course or a group (Jot et al., n.d.). Although, the phenomena under investigation is not completely controlled by the researchers, the case study research can provide relevant knowledge about a complex phenomena within **its real life context** (Baxter and Jack, 2008). The aims of a case study research are **to gain an in-depth understanding of a case and the interaction between the phenomenon and the case** (Randolph, 2007). In a case study research, several sources of data, such as documents, observations, interviews are used to get a deep understanding of the case. The typical data analysis methods are pattern-matching, content analysis, and finding complementary cases.

Baxter and Jack (2008) refer to Yin (2003) when describing when to use case study research:

- a) the aim is to answer “how” and “why” questions
- b) the case study research can be used to pilot further research or test theories
- c) the researcher is not able to manipulate and control the behaviour of the individuals.
- d) contextual factors are highly relevant to the phenomena under study. For instance, laboratory settings or controlled tests would not provide natural and real results.
- e) the boundaries between the phenomena and context are blurred

According to Flyvbjerg (2004), the case study is ideal for generalizing in using the “falsification” test, e.g. if just one observation does not fit with the proposition, it is not considered to be valid in a general sense. The proposition (if it claims to be general) must be revised or rejected.

Flyvbjerg, B. (2004), presents five main concerns about the nature of case study research

- 1) general, theoretical knowledge is more valuable than concrete, practical knowledge
- 2) since one cannot generalize from an individual case, the case study cannot contribute to the scientific development

- 3) the case study is most useful for generating hypothesis
- 4) the case study contain a bias towards verification; e.g. tendency to confirm researcher's notions
- 5) it is difficult to summarise and develop general theories on the basis of a specific case study

Data selection in case study research

The objective in case study research is to collect as much information about the research problem or phenomena under study. According to Flyvbjerg (2004), collection of a representative or random sample might not be the most informative. Atypical and extreme cases reveal often more interesting information (for instance unexpected results) than random or typical cases.

Table 2 summarise the strategies to increase the information gain in case study research. Similarly, the same criteria can be used in other qualitative methods to support the decision on data selection.

Table 2: Different case selection criteria

Strategy	Purpose
Random sample	To avoid biases in the sample. The sample size is important for generalization.
Stratified sample	To generalize for sub-groups within the population
Extreme/deviant cases	To obtain information about unusual cases
Maximum variation cases	To obtain information from cases that differ from each other
Critical cases	To achieve information about a case that has a strategic importance to the problem. The case of falsification.
Paradigmatic cases	To develop a metaphor for the domain that the case concerns

Pros and cons of case studies

Table 3 summarizes the strengths and weaknesses of case studies (Joy et al., n.d.)

Table 3: Strengths and weaknesses of case studies

Strengths	Weaknesses
+ results are easy to disseminate to a	- generalizations cannot be made

non-technical audience + observation of the effect of a “real context” + comparison between similar cases and situations	easily. - cannot be reproduced easily (or even verified) - there may be observer bias.
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The following example gives an insight how case studies could be used in computer science.

Example of a case study research in computer science

Layman, L., Williams, L., and Cunningham, L. 2004. Motivations and measurements in an agile case study. In Proceedings of the 2004 Workshop on Quantitative Techniques For Software Agile Process (Newport Beach, California, November 05 - 05, 2004). QUTE-SWAP '04. ACM, New York, NY, 14-24. DOI=<http://doi.acm.org/10.1145/1151433.1151436>

“With the recent emergence of agile software development technologies, the software community is awaiting sound, **empirical investigation** of the impacts of agile practices in a **live setting**. One means of conducting such research is **through industrial case studies**. However, there are a number of influencing factors that contribute to the success of such a case study. In this paper, we describe a case study performed at Sabre Airline Solutions **evaluating the effects of adopting Extreme Programming (XP) practices** with a team that had characteristically plan-driven risk factors. We compare the team's business-related results (productivity and quality) to two published sources of industry averages. Our case study found that the **Sabre team yielded above-average post-release quality and average to above-average productivity**. We discuss our experience in conducting this case study, including specifics of **how data was collected, the rationale behind our process of data collection, and what obstacles were encountered during the case study**. We also identify four factors that potentially impact the outcome of industrial case studies: **availability of data, tool support, co-operative personnel and project status**. We believe that recognizing and planning for these factors is essential to conducting industrial case studies, and that this information will be helpful to researchers and practitioners alike.”

5. Grounded Theory

According to Dunican (2006) and Randolph (2007), grounded theory is an inductive qualitative research method where the theory or models emerge from the data via a spiral research process, e.g. the theory is said to be “grounded” to the research context. Randolph refers to Creswell (2007) stating that grounded theory is appropriate when there is no existing theory related to the phenomena or the existing theories are not complete.

According to Dey (2004) there is not a single unified, well-defined method called “grounded theory”, but different interpretations of grounded theory from the early developers Glasser and Straub to the recent variations. However, there are also commonalities.

- **Primary purpose:** create theory from the data
- **Research data:** relies mainly on qualitative (can also be quantitative) data acquired through a variety of methods, such as observations, interviews and document analysis (Dunican, 2006). The data collection becomes more structured as the study progresses.
- **Selection of data:** theoretical sampling of data based on the potential contribution to the development of theory
- **Data analysis process:** coding the data into categories, which represent the key aspects of the data. The data collection stops in grounded theory when the categories reach saturation, e.g. the researcher is no longer capable of creating new categories

The coding process consists of the following phases

- 1) identification of categories in data. Open coding is used to examine the text for items of interest, with the ultimate aim of accumulating codes into categories.
- 2) building relationships between categories. A researcher uses a comparative approach where he/she constantly compares new instances of the category with those already encountered until he/she saturates the category (i.e. no new insights in the category can be gained from the data).
- 3) grouping the categories together to form theoretical constructs. The net outcome of grounded research is a theory that contains a central phenomenon, its causal conditions, its intervening conditions and its consequences

An important part of the research process is to decide when enough data has been coded. When multiple behavior occur, the data is said to be saturated. GT has similarities to case study research and ethnography, since both the latter aim to detect and interpret patterns within activities and events (de Villiers, 2005).

Criteria for well-constructed grounded theory

- 1) the categories and properties should fit into the reality being studied
- 2) the theory should explain variations in the phenomena
- 3) the emerging theory is open to adaptation as new data is integrated
- 4) data collection, analysis and presentation to peers should be linked at each step

Possible application areas in computer science

- to study organizational structures and experiences in order to develop new technologies
- to the development of software of non-standard interactive environment, such as culturally sensitive and contextulised e-learning (de Villiers, 2005a)
- to study the interaction of users with new technological innovations, such as tangible technologies

Table 4 summarises pros and cons of grounded theory research method.

Table 4: Strengths and weaknesses of grounded theory

Strengths	Weaknesses
+ identifies the situated nature a knowledge, as well as the contingent nature of practice	- overwhelming amount of data => difficult to manage
+ produces a 'rich' or 'thick' description that properly acknowledges areas of conflict and contradiction.	- investigator needs to be well skilled with the method (Randolph, 2007)
+ more likely to determine what actually happens	- no standard rules to follow <ul style="list-style-type: none"> • identification of categories • saturation of data

More information about grounded theory

http://en.wikipedia.org/wiki/Grounded_theory

Example of grounded theory in Computer Science

Razavi, M. N. and Iverson, L. 2006. A grounded theory of information sharing behavior in a personal learning space. In Proceedings of the 2006 20th Anniversary Conference on Computer Supported Cooperative Work (Banff, Alberta, Canada, November 04 - 08, 2006). CSCW '06. ACM, New York, NY, 459-468. DOI= <http://doi.acm.org/10.1145/1180875.1180946>

This paper presents a **grounded theory of information sharing behavior** of the users of a personal learning space. A personal learning space is an environment consisted of weblog, ePortfolio, and social networking functionality. It is primarily used within **education as a tool to enhance learning**, but is also used as a knowledge management tool and to develop communities of practice. Our results identify **privacy as a main concern for users of a personal learning space** and **illustrate challenges users face in ensuring privacy of their information** and strategies they employ to achieve the desired level of privacy. We then identify factors that affect users' decisions regarding disclosure of their personal artifacts to various people and groups in a personal learning space. The three main themes as emerged in our study include **current stage in the information life cycle, the nature of trust between the owner and the receiver of information, and the dynamics of the group or community within which the information is being shared**. Together, these themes portrayed a clearer picture of users' perspective on the privacy of their information in a personal learning space. The findings offer some ideas about how to create privacy management mechanisms for personal learning spaces that are based on users' mental model of information privacy. Practical implications of the results are also discussed.

Data collection methods in qualitative and mixed method research

Interviews

While questionnaires can be used both in quantitative and qualitative research, interviews are mostly used in qualitative research to collect research related information (Cohen, Manion & Morrison, 2000) about

- knowledge of the people
- opinions, e.g. likes or dislikes
- what persons are thinking about
- attitudes
- motivations.

There are different ways on how the interviews can be organized. According to (Cohen, Manion & Morrison, 2000), the following interview types are common:

1) *Open-ended (unstructured) interview*

In open-ended interview, the interview process follows an informal conversation pattern. In the beginning of the interview, the interviewee asks general questions related to the research topic and the following questions are dependent on the respondents' answers. In an unstructured interview, the aim is not necessary to cover the same topics with all the respondents, but to discuss different topics. The questions can also appear randomly. In open ended interviews, the respondents are able to demonstrate their unique way of looking at the phenomena and the interview situation is flexible and dynamic. An open-ended interview can also reveal unexpected data.

2) Closed (or structured) interview

A structured interview is carefully designed and scheduled in order to cover the same topics with all respondents. The advantage of closed interviews is that the collected data will be more focused compared to open interviews. The data will also most likely include information that is inline with the objective of the research.

3) Focus group interviews

Focus group interviews are moderated group discussions (with 8-12 people) on a particular topic/issue (Randolph, 2007). Focus groups are useful for gathering information from a group of respondents at one time. A common approach in focus interviews is to invite a group of experts to discuss about the research topic. The aim is to get the experts to provide different perspectives to the discussion. If the focus group interview session is organized correctly, the atmosphere can encourage participants to speak and interact spontaneously. On the other hand, some participants may dominate the conversation or others can feel uncomfortable in being open in a group situation. It is common that the focus group interviews are both recorded on video and the researcher makes notes during the focus group interview session.

<i>Strengths</i>	<i>Weaknesses</i>
<p>+ in depth knowledge from the respondents</p> <p>+ flexibility and ability to get lot of useful information</p> <p>+ allows focusing questions</p>	<p>- time consuming and expensive to organise</p> <p>- respondents may feel uncomfortable to speaking openly to unknown interviewer – fear of losing the face</p> <p>- respondents are sometimes eager to give answers that in their opinion interviewer wants to hear</p> <p>- source of bias; interviewer, respondent, and questions (Cohen, Manion & Morrison, 2000)</p> <p>- researcher will have some influence on the interviewee, which will effect the data. For instance, attitudes, opinions and expectations of the interviewer can have effect on the answers.</p> <p>- data analysis takes time and resources</p> <p>- communication problems: misinterpretation of question and answer, poor handling of difficult interviews</p> <p>- focus group interviews: how to motivate the experts to participate and how to get the “correct” people</p>

Recommendations for conducting interviews

- 1) plan interviews carefully
 - write down list of areas which needs to be covered and transform them into questions, decide on the type of interview
 - draft the interview schedule, content, wording, format and structure
 - make appointments with respondents

- 2) always try to record the interview
- 3) issues to be remember during an interview session (Cohen, Manion & Morrison, 2000)
 - use clear, concise and precise language
 - listen carefully to the answers and let the respondents freely express their thoughts
 - recap some of the respondents answers in order to get an agreement of the meaning
 - maintain eye contact and use appropriate body language to create a nonjudgmental atmosphere
 - do not show your own opinions to the respondents
 - reinforce and encourage further comments and follow ups
 - try to create a situation where respondents are sincere, well-motivated and both the researcher and the research subject feel comfortable

Example

An example of a qualitative research interview protocol can be found at:

<http://www.edu.plymouth.ac.uk/resined/Qualitative%20methods%202/arkedpg.htm>

Direct observation

In the direct observation method, the researcher observes people's normal behaviour without disturbing the situation. The term "non-intrusive" is also often used to describe this method to remind that the researcher should not intervene with the research settings (Randolph, 2007). According to Taylor-Power and Steele (1996) suggest that seeing and listening are the key aspects of direct observation. The method provides the opportunity to collect such data that, for instance, might be difficult to retrieve via questionnaires or interviews. In some case, behavior of the people can also be recorded with a video camera.

Randolph (2007), in direct observation a researcher directly observes the behaviour of participants by using commonly the following methods

- 1) free form; peering over participant's shoulder and taking notes how a participant is behaving
- 2) researcher operationalise a behavior and counts how many times the behavior occurs over a given period or categorises the events

One approach is to mix the two methods; first perform a pilot study with free recording and then use the results to define the criteria for grouping in a wider study (Randolph, 2007). Several observers can also be used to increase the reliability of the results. However, when there is more than one observer, it is important to reach a level where the observers agree about the recording and grouping criteria (e.g. which event belongs to which category). Verbal protocol (e.g. think-a-loud) technique can also be used as a supportive data collection method in direct observation.

Focus of observation (Taylor-Power and Steele, 1996)

- 1) characteristics of participants; values, attitudes, skill and knowledge levels
- 2) interactions in a social situations
 - unconscious behavior
 - level of participation
 - power relationships
 - climate in the research settings under study
- 3) nonverbal behavior
 - facial expressions, gestures
 - interests and commitments
- 4) physical surroundings

Examples of use in Computer Science

- requirement capturing
- product evaluation, e.g. something physical that can be readibly seen and evaluate (Taylor-Power and Steele, 1996)
- investigation of problem areas with software/other computing equipment
- research on people's behavior, for instance, in work places, schools
- how students interact with each other when they are using a technological innovation to support collaborative work

<i>Strengths</i>	<i>Weaknesses</i>
+ research participants can be observed in their natural environment to collect direct information (Taylor-Power and Steele, 1996)	- people might behave differently (e.g. perform better in tasks) when they have been observed, e.g. “Hawthorne effect”
+ different kind of conclusion can be made from the rich data	- find an appropriate balance between structure and free recording, e.g. too much structured observation approach might limit the unexpected findings
+ researcher can observe behavior of more than one person performing a certain task or using the same equipment => helps to understand an ongoing behavior, process or event (Taylor-Power and Steele, 1996)	- lack of control to the participants
+ collect non-verbal information, e.g. anxiety, frustration and body language	- researcher can get too much involved into the research settings
+ first-hand experience can be collected of the behavior of participants, individually and as a group (Randolph, 2007)	- the researcher can misinterpret some of the behavior
+ gain knowledge about the research context	- requires resources and time both for organization and analysis

Recommendations for using direct observation (Randolph, 2007; Taylor-Power and Steele, 1996)

- carefully plan the direct observation study in order to ensure commitment both from the researchers and participants and to clarify the appropriate focus => what do you want to know?
- observers role should be made clear and there should be a clear plan towards the performed observations (what to observe and record, what are the most important aspects, focus on unusual behavior)
- it might be also necessary to perform interviews later on to clarify the results of the observations => it is important to know what is users/research subjects view about credible and useful information
- for ethical reasons participants should not be observed without being informed about the investigation, but on the other hand “hidden” observation might reveal more realistic data

- it has been estimated that basic analysis will take at least twice as long as the length of the material, e.g. with three hour recording the analysis takes at least six hours (even more in some cases). The reporting of the results is also time consuming, so it is estimated that one hour of recording requires six times the amount of time for analysis and reporting

Log files

With the development of IT, log files has become an alternative data collection method for research in computing. The user-generated data in log files can be used, for instance, in educational technology to record how students have been using a digital learning environment (Randolph, 2007). Log files also enable that lot of data can be collected automatically with low costs. For instance, web servers can automatically record data about the visitors in web pages: visited pages, visitor country, visiting time and day, IP address.

Examples (Randolph, 2007)

1. how long users have been using an application
2. what features the users have used and how often
3. how often they have used one feature in conjunction with another
4. texts from chat rooms or discussion forums

<i>Strengths</i>	<i>Weaknesses</i>
+ data is captured directly in a digital form, so there is no need to encode the data later on	- overwhelming amount of data
+ the collected data is natural and the data collection process is unobtrusive	- temptation to collect and analyse the data without permissions (Randolph, 2007)
+ any aspects of user's interaction with an application can be stored	- reveal only technical aspects, not meaning, reasons, goals => needs often additional data collection methods
+ lot of data can be collected at minimum costs	

Content analysis

Content analysis is data collection method or research tool to study the content and meaning of texts and information resources, such as books, essays, interviews, discussions, historical documents, speeches, conversations, website and images (Randolph, 2007). Because content analysis can be used to examine basically any piece of writing or occurrence of recorded communication, it is widely applied in many disciplines and fields of inquiry, such as media studies, literature, cultural studies, psychology, cognitive science and computer science.

Stemler (2001) refers to Holsti (1969) to give a broad definition of content analysis

"any technique for making inferences by objectively and systematically identifying specified characteristics of messages".

Content analysis can be used, for instance, to study authorship, authenticity and meaning of communication to study who says what, to whom, why, to what extent and with what effect (Stemler, 2001)

Examples of content analysis uses include (Randolph, 2007; Stemler, 2001)

1. reveal cultural differences in communication content
2. detect the existence of propaganda
3. identify the intentions, focus or communication trends of an individual, group or institution
4. examine trends and patterns in documents
5. determine psychological or emotional state of persons or groups. For instance, monitoring shifts in public opinions.

Stemler (2001) present the following concrete example:

A school mission statement were investigated to make inference about what schools thought was the main primary reason for existence. One of the main questions of the study was whether the criteria used to measure the effectiveness of the program were aligned with the overall program objectives or reasons for existence.

Aspects that need to make into consideration (Stemler (2001) referring to Krippendorff (1980))

1. What is the data that is going to be analysed
2. How the data is defined?
3. What is the population where the data is drawn?
4. What is the context relative to which the data are analysed?
5. What are the boundaries?
6. What is the objective of the analysis?

A general process for content analysis

1. Identify the research question
2. Choose the data samples for analysis
3. Determine the type of analyses
4. Reduce the text to categories and code for words and patterns
5. Explore the relationships between concepts
6. Code the relationships

7. Perform statistical analysis, for instance, to analyse the reliability of the results
8. Map out the representations

During a content analysis process, the text is coded, or broken down, into manageable categories on a variety of levels - word, word sense, phrase, sentence, or theme - and then examined using either conceptual analysis or relational analysis. In the conceptual analysis, the purpose is to identify existence and frequency of concepts in a text (Randolph, 2007). For instance, one can use the conceptual analysis to find out how many times certain themes appear in discussion forum postings. The relational analysis goes one step further by examining the relationships among concepts in a text.

There are basically two coding schemes used in content analysis (Randolph, 2007)

- 1) a priori coding scheme; existing theory is used to create the categories and the content is analysed based on the categories
- 2) emergent coding scheme; the categories emerge from the content, no previous theory is used to create the categories (compare to grounded theory)

In any cases, a coding book should be created to support the analysis process. The coding book depicts the important variables of the study and the procedures of coding the data. For instance, the researcher needs to make explicit the coding unit of the study (e.g. the smallest entity to be categorized). Examples of study units are natural boundaries of the document, separations used by authors (words, sentences), referential units and propositional to infer the underlying assumptions (Stempler, 2001).

McLoughlin, D., Mynard, J. (2009). Innovations in Education & Teaching International, Volume 46, Number 2, pp. 147-160.

Abstract:

This paper describes a study of **online discussion forums** as tools for promoting higher-order thinking. The study was carried out in a women's university in the United Arab Emirates. Data, in the form of online discussion forum transcripts, were collected over a 20-week semester and were analysed according to a model developed by Garrison, Anderson, and Archer (2001). Discussion forum postings were **analysed for evidence of higher-order thinking and were placed within one of the model's categories of** 'triggering', 'exploration', 'integration', or 'resolution'. The researchers did find evidence of higher-order thinking processes. The results showed that the majority of postings were either categorised as 'exploration' or 'integration'. The results also supported the notion that the correct conditions need to be present in order for higher-order thinking to arise. **The findings suggested that the initial teacher**

prompt or question may have had a bearing on the nature of learners' postings.

<http://www.ingentaconnect.com/content/routledg/riie/2009/00000046/00000002/art00004>

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