HÖGSKOLAN VÄST
School of Business, Economics and IT
Division of Informatics

AFI600

Advanced Research Theory and Methodology in Informatics

VT22 LP3

COURSE PAPER

Author: Kanniga Lakshmi Jagadeesan
kanniga-lakshmi.jagadeesan@student.hv.se

Supervisor : Maria Spante

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1 Introduction

One of the important and measurable success factor for a course completion at any level is by understanding and gaining good knowledge over the academic area and use it for research purpose, practical applications or for further academic specialization. AFI600,Advanced Research Theory and Methodology in Informatics is one of the post graduate program administered by division of Informatics, headed by School of Business, Economics and IT at University West, Trollhattan. This course paper has been written to demonstrate the knowledge and understanding of theories and approach of the same, analyze qualitative and quantitative methods used in a scientific article, review scientific journals/articles, ethical principles while writing a scientific paper. With this in mind, the sections of the course paper has been divided based on the lectures, individual and group activities of workshops conducted throughout the entire duration of the course. Most of the sections covered in this course paper tends to follow the course literature specified. (Bryman, 2012) All the sections included in this course paper is structured to be consistent with every other section. This is very important to judge the student's understanding to explore further for the upcoming Master's thesis work (Course code - EXI802).

2 Learning Outcomes

2.1 Scientific and theoretical approaches

A social research is guided and enlightened by theory. Research activities helps theory in one way since the outcomes of a research will be added to the body of information that the theory is based on. Another viewpoint is to consider theory as a product of the research process, that is, as something that emerges after the investigation has been completed. It is far from simple to define the nature of the relationship between theory and investigation. There are a number of problems at stake here, but two in particular stand out. First, there's the issue of determining which type of theory is being discussed. Second, there's the question of whether data is being gathered to test or create hypotheses. The importance of theory to the social researcher is that it gives a context and justification for the study being undertaken. It also provides a framework through which social occurrences and research findings may be understood and analyzed (Bryman, 2012).

2.1.1 Deductive and Inductive theory (Bryman, 2012, pp. 24-26)

The researcher uses process of deduction when the basic knowledge in a specific domain is known and theoretical considerations form the ground for research. A hypothesis or hypotheses is deduced before hand. Based on these hypothetical factors, the researcher decides on how/what data to be collected to be relevant with the hypothesis. The collected data is scrutinized(statistically evaluated) to confirm or reject the hypotheses. Revision of theory may or may not take place according to the results/findings obtained. When this process is followed in a opposite direction, it is called the inductive approach. Researchers collect the data first. Based on the findings/results qualitative analysis is proceeded and a theory is born.

Bryman (2012) also discusses about the pros and cons of using deductive and inductive approach. While there is an element of inductiveness in the approach described, it is often considered to incline towards deductive approach. Although, the deductive approach may look like a linear process, it may not necessarily strictly adhere to the structure as shown in figure **??**. However, in few scenarios, a researcher's perspective on the theory or literature may have shifted as a result of the data analysis; new theoretical ideas or findings may be published by other researcher(s) before the current study findings has been generated or the relevance of a set of data for a theory is evident enough after the data has been collected.

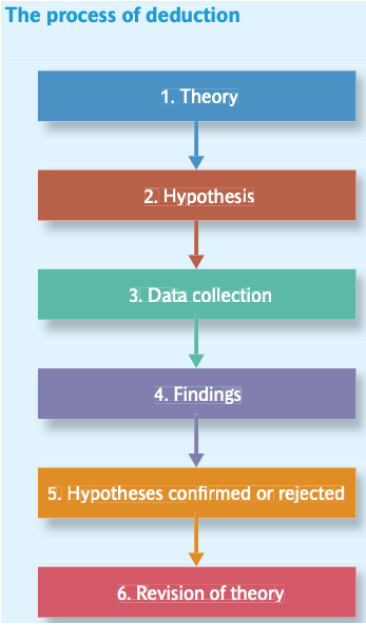


Figure 1: The process of deduction (See Figure 2.1 in Bryman (2012), p.24)

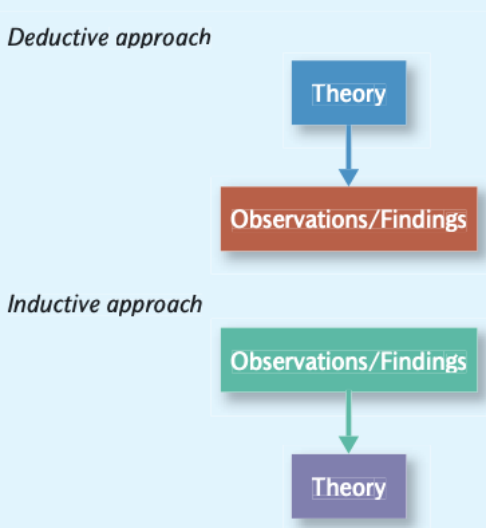


Figure 2: Deductive and inductive approaches to the relationship between theory and research(See Figure 2.2 in Bryman (2012), p.26)

Based on the above discussion, Bryman (2012) has clearly sorted out the difference between deductivism and inductivism. This can be well understood by figure (ref). It can be rightly said that, theory is an outcome of an inductive approach based on the findings, while theory gives rise to observations in a deductive approach.

2.1.2 Epistemological considerations (Bryman, 2012, pp. 27-32)

The study of what is (or should be) considered acceptable knowledge in a discipline is an epistemology. The question of whether the social world can and should be researched using the same principles, methodologies, and ethics as the natural sciences is particularly important in this context. The value of replicating the natural sciences is inextricably linked to positivism, an epistemological perspective. (Bryman, 2012)

Positivism : Use of natural scientific approaches to investigate social reality and beyond is positivism. However the components differ depending on the author. However, the following principles are also considered to be part of positivism:

- **Phenonenalism** - Authentic knowledge gained only through phenomena and thus knowledge confirmed by the senses.

- **Deductivism** - The goal of a theory or theories is to formulate hypotheses, test and further evaluate their interpretation.
- **Inductivism** - Collection of facts that serve as the foundation for laws helps to acquire knowledge.

Example – Water (2 elements of Hydrogen and 1 element of Oxygen) If any one element is missing is missing, there is no water. (Numbers play an important role !)

Interpretivism : alternative to the decades-old positivist dogma. It is based on the belief that a strategy is needed that takes into account the differences between humans and natural science objects, and hence needs the social scientist to understand the subjective meaning of social activity.(Bryman, 2012)

Example – Why most of the people prefer to eat popcorn while watching movies? (behavioural analysis)

While there exists an interconnection between epistemological considerations and research practice, it's vital not to exaggerate them because they are more like trends than exact points of correspondence. As a result, certain epistemological principles and research methodologies may not always go hand in hand in a precise way.(Bryman, 2012)

2.1.3 Ontological considerations (Bryman, 2012, pp. 32-34)

Ontological questions mostly arises from the nature of social entities. The primary topic Social entities considered as objective things with a reality separate from social actors, or whether they can be considered as social constructions based on social actors' perceptions and actions is the primary focus here. These perspectives are sometimes referred to as objectivism and constructionism, respectively. Two of the most popular and essential terms in social science — organization and culture can be used to highlight their contrasts. (Bryman, 2012)

Objectivism - Objectivism implies that social phenomena and also the categories that we use in day-to-day coomunication have an existence that's independent from social actors.(Bryman, 2012)

Example – Let's take Organization as an example. Each organization varies with their mission statement, guidelines and protocols. Certain number of people instruct/guide some number of people who delegates the task to other people. When members in an organization does not abide by any of the said rules, either they are fired or reprimanded. So, an organization is the constraining force here on people who work.(Objective reality)(Bryman, 2012)

Constructionism – People as social actors determine the categories that exists in the social world and the process is examined. These categories helps to differentiate between the natural world and social world. The meaning to the categories is determined by social interaction. (Bryman, 2012)

Example – Pink is for girls and blue is for boys. Gender and colour are the two categories.

Based on the approach between the theory and research, epistemological and ontological considerations in a social study, Bryman (2012) indicates notable differences between two research strategies. One being Quantitative and the other one Qualitative. Differences are well-laid out in table 1.

Quantitative	**Qualitative**
Quantification in collection and analysis of data	Emphasizes words (quality aspects)
Deductive approach to the relationship between theory and research, in which focus is more on the testing of theories.	Inductive approach to the relationship between theory and research, where theory is an outcome of research.
Incorporates the practices and norms of the natural scientific model and of positivism in particular(Positivism)	Reject the practices and norms of the natural scientific model and of positivism in particular in preference for an emphasis on the ways in which individuals interpret their social world.(Interpretivism).
Social reality is viewed as an external, objective reality. (Objectivism)	Social reality viewed as a constantly shifting emergent property of individuals' creation. (Constructionism)

Table 1: Fundamental differences between quantitative and qualitative research strategies (See Table 2.1 in Bryman (2012), p.36)

2.2 Theories relevant to Informatics

Gregor(2006) shows that Information Systems is an inter-disciplinary field where the knowledge of human behaviour and properties of physical objects blend.There exists shared features or attributes which interlay with other main disciplines such as engineering or architecture where artifacts and people are concerned. In the field of applied discipline like medicine, products of scientific knowledge such as treatments or drugs are used in the human society. Thus, to get an understanding of Information systems as a whole, Theory acts as a bridge between the social world, natural world and artificial world of human artifacts. Gregor(2006). Various researchers in different discipline have given their perspectives of theory. Some of the multi-facet views that Gregor(2006) has tried to establish in this article is shown below.

Ontological view of theory can be defined as a set of statements that

- describe how something should be done in practice.
- serve as a lens through which to see or explain the world.
- can be tested about relationships between constructs.

However, Gregor(2006) argues that nature of a theory is influenced by specific domain in each discipline. Use of artifacts in human-machine systems is a notable feature that makes the nature of theory in IS differ from other disciplinary areas.From an epistemological point of view, Gregor(2006) shows that scientific philosophers no more consider logical positivism as a functioning one, reason being only experience was considered to

be the source of knowledge and meaning. The interpretivist tradition directs researchers in a different direction, with the primary goal of understanding the complex world of lived experience from the perspective of those who live it, rather than developing theory that can be tested in a narrow sense (though its validity and credibility can still be assessed).Gregor(2006) shows that theory exists in three different worlds.

- World 1 - Objective world of physical objects.
- World 2 - Mental state in a subjective world.
- World 3 - Abstract entities (man-made) that includes ethics, language, art, science, organizations,mathematics.

2.2.1 Classification of theories in IS

However, Gregor(2006) goes with the view of theory in World 3 and has proposed a classification model. This taxonomy was also based on the analytic methods when the defining characteristics of theory can be gleaned from a large body of literature.This classification is important as it helps future researchers to identify a similar phenomena, compare and contrast as well as provide guidelines on how the theory should look and evaluated. Another benefit is to provide intuition and enhance easy understanding.

The given below table (see Table 2 in Gregor(2006))in this paper provides information about the five types of theory in Information Systems.

Theory Type	Distinguishing Attributes
I. Analysis	Says what is. The theory does not extend beyond analysis and description. No causal relationships among phenomena are specified and no predictions are made.
II. Explanation	Says what is, how, why, when, and where. The theory provides explanations but does not aim to predict with any precision. There are no testable propositions.
III. Prediction	Says what is and what will be. The theory provides predictions and has testable propositions but does not have well-developed justificatory causal explanations.
IV. Explanation and prediction (EP)	Says what is, how, why, when, where, and what will be. Provides predictions and has both testable propositions and causal explanations.
V. Design and action	Says how to do something. The theory gives explicit prescriptions (e.g., methods, techniques, principles of form and function) for constructing an artifact.

The five types of theories are interrelated as shown in figure 3 Theory for analyzing is the basic type of theory and related to all the other theories. There exists a strong bond (red colour ring as shown in figure 3) between EP theory and theory for design and action. Some comprehensive and well-developed theories may contain components of all types of theories described. This plays a nuclear part to impart various ways in which knowledge is developed and expressed.

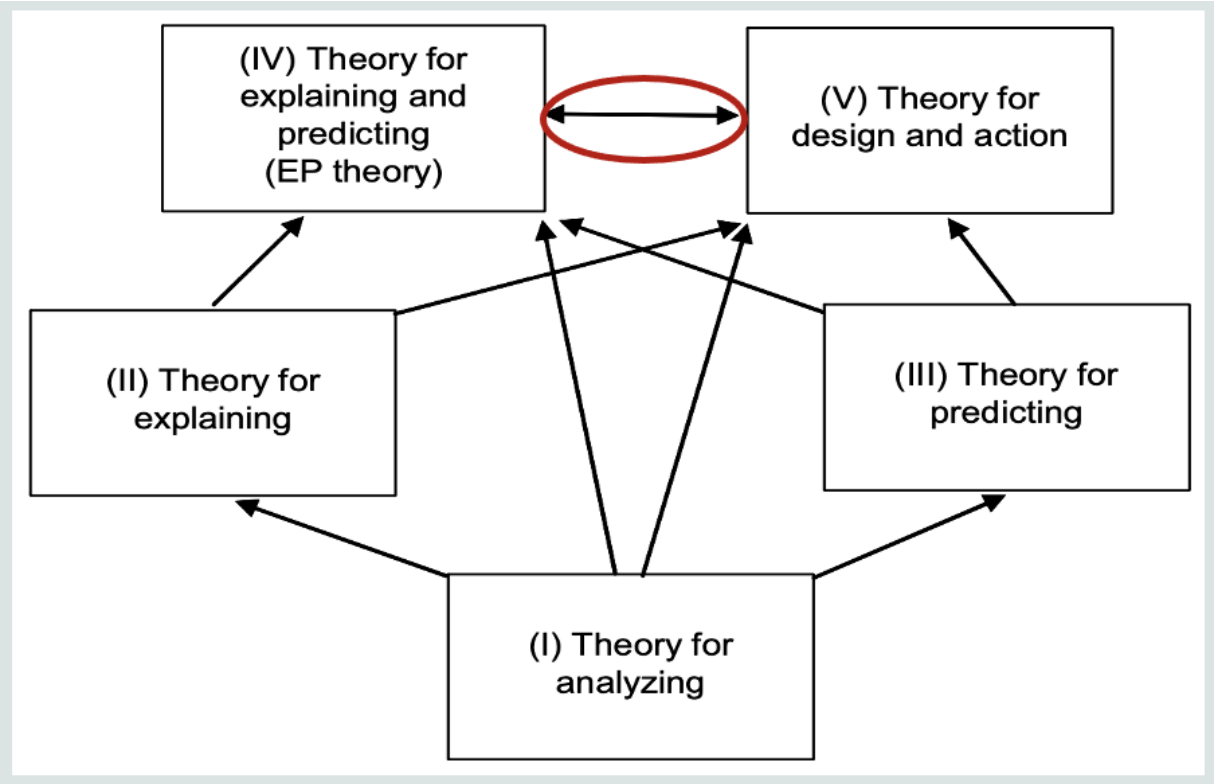


Figure 3: Interrelationship among theory types (Figure 1 in Gregor,2006)

2.3 Literature Review and search

The author of this course paper has read the contents and strongly agrees with (ref:ch5, Bryman) to present this section with the knowledge gained and understanding of the need for literature review, literature search, importance of using references and avoid plagiarism.

Need to review existing literature review - The foremost step is to identify the ares of interest. Based on this,scholarly research of the same should be conducted on what has already been read and interpret other researcher's work in the same topic. Using the existing literature on a topic is one of the good ways to make an argument for the importance of study and where it will lead in the future. Whatever varied interpretations of the literature review process is chosen it's critical to be clear about the end goal.A competent assessment of the literature is, at least in part, a way of establishing reputation as an expert in the chosen field.It is not only about a matter of using other scholars' theories and beliefs, it is an interpretation of what they have written, perhaps by employing their ideas to support a specific stance or argument.On successful investigation of the existing literature in the area of interest, the following issues needs to be identified to attain the purpose of conducting a literature review.

- Past and ongoing research.
- Related theories and concepts.
- Research methods and strategies used.
- Major points of disagreement.

- Discrepancies involved.
- Unanswered research questions.

The last point holds good to identify the literature gap and bring up a new study or frame a new research question by the process of revision and refinement.

Ways to get the most from reading - Bryman argues that active and critical reading skills are important to get the most out of reading. The following steps ensures a fruitful reading to conduct a literature review.

- Details of the reading with minute details like volume number and pages can be taken in the from of notes.
- Critical approach while reading to reflect upon the author's assumptions, findings, objectives, conclusion and data validity.
- Literature search should be guided by a well framed research question.
- Literature review need not be duplication of already existing work, rather bring an argumentative discussion.
- Reading a literature must be carried out throughout the whole process until the review is completed.

Systematic review - Systematic review is one way of reviewing the literature by adopting explicit procedures where there is a lack of thoroughness and researcher's bias is clearly visible. Systematic review helps to unfold these two areas and bring the limelight of the subject. Bryman suggests that Systematic review has been quite useful in the field of medicine because evidence-based approach acts as a complimentary factor to establish the findings. Obviously, this helps the practitioners and clinicians to play with the data. Systematic review has also begin to find it's place in social study. Bryman (ref) indicates the below steps that can roughly act as a guide while doing a systematic review.

1. Purpose and scope of the review needs to be clearly defined.
2. Look for relevant studies which answers step 1.
3. Appraisal of studies from Step 2.
4. Analysis of each study and synthesis of results.

Narrative review - Bryman(ref) shows that narrative literature review works best for qualitative studies. One reason being, the relationship between theory and research is inclined towards inductive rather than deductive. Another reason is that during the data analysis phase, researchers requires more flexibility to modify the subject boundaries. As a result, they tend to change their theoretical view or literature as the get along the subject line. But there are some limitations using narrative review. It might lack enough evidence to reproduce, lack discrimination to evidence and comprehensiveness remains a question. May be due to these factors, Systematic review has been wide spread among among researchers recently.

Literature search - Bryman observes the use of books, journals and scientific reports

while carrying out a review on the first hand. Andra source can electronic databases such as SCOPUS, Academic source premier, etc..,. This will be mostly carried out on the University West's library database and the workshop mentioned in section 3 with figure 11 as reference using the right keywords and article search. However, websites can also act as a good reference but needs to be valid by observing the below.

- Author of the site and the motive for publishing.
- Location of the site with the help of an URL. Identify whether it is an academic site or government site or organizational one.
- Past and latest updates of the website to ensure credibility.

Plagiarism - Plagiarism should be avoided at any cost while writing a paper. It is annoying for both the publisher and the researcher when encountered. This can be overcome by usage of the right references as shown in 3 and the text should be one's own understanding and interpretation rather than the exact text from the read article.

2.4 Critical Review

Now that, an idea of how to search for a good literature and how the text should be written with proper references has been defined, it is very important to review a published scientific article. As a part of this course paper, in-depth analysis of qualitative and quantitative study with the empirical data and review of the same in accordance with the structure that has been prescribed in the workshops has been followed in this section and insights provided.

Research Question: Is Agile approach changing in IT industries?				
Subject term from RQ	**Agile**	**changing**	**IT**	**Industries**
Synonym or related term	Iterative	Adapting	Software	Management
Synonym or related term	Repetitive	Modifying	Infotech	Business
Synonym or related term	Reiterative	unstable	Data processing	Corporation

Table 2: Subject terms and synonyms of research question

Database used for search - Academic search Premier
Number of articles with only keywords and synonyms(S1 AND S2 AND S3 AND S4)[1] - 352
Inclusion criteria applied : Peer reviewed, Language: English, Published year - 2017 to 2022
Results obtained - 139
Inclusion criteria applied:
Narrow by Subject Thesaurus: - information technology, information & communication technologies, computer software development – management, systems development, software engineering, computer software industry, computer software development, agile software development
Final count of articles : 12
Exclusion criteria applied:

[1]This will be explicitly shown as a flowchart model with the keywords, boolean operators , inclusion and exclusion criteria at each stage in the methodology section in the upcoming thesis work

Number of articles rejected based on abstract and methodology used - 9
Number of articles rejected based on non-accessibility(paid fee:40 SEK) - 1
Articles selected for review - 2

Most of the studies follows some basic structure as shown in figure 4. Based on this, content and data analysis of the two selected studies along with the knowledge gained from this course has been effectively used to present a brief critical review.

Abstract	A short summary of the article, presenting the aim, method, results and conclusions of the article. Keywords are also provided to mirror the contents of the article.
Introduction	A general background. The aim and research questions are presented as well as the limits of the study
Method and material	The methodology, and in some cases the material used, are described. The description should be detailed enough for other researchers to assess the reliability and credibility of the study and be able to repeat the research
Result	Here you'll find the research results. Diagrams and tables may also be included.
Discussion/Conclusion	Evaluation of the results of the study. Methodological considerations and how the results relate to earlier research are discussed
References	All cited documents included in the article must be found in the reference list

Figure 4: General structure of a scientific article (ref)

2.4.1 Critical review of a qualitative study

The impact of requirements on systems development speed: a multiple-case study in automotive. (Ågren et.al., 2019))

This article mainly focuses on the need for a change in requirements at certain stages with an agile framework being followed in during the development stages of the product in automotive industries. The study involved multiple case studies with semi-structured interviews with a wide range of participants.

ABSTRACT - Well written abstract with keywords and provided the reader, the purpose of the study in automotive domain.

INTRODUCTION - The goal of the study with it's main purpose along with the previous research that was carried out has been well presented with good references. The structure of the entire paper with well-framed research questions has been explicitly written. A good view of the research participants and their role has been summarized well. However, the limitations of the study pertaining to specific department or organization is missing.

METHODOLOGY - Detailed descript ion of the research participants and phases of

the study with ethical principles involved and the type of interviews conducted gives the reader a good understanding. Reason for selection of research participants with varied experiences could have been justified. Since, the study is an extension of an already published one, the materials used for this particular study has not been specified in this section.

RESULT - The three research questions has been well presented with the respondents qualitative aspects analysis at each stage, The authors has beautifully quoted some important respondents feelings towards their perspective view. One suggestion that could have been improved here is the segregation of respondents survey as per the experiences given in the methodology section to trigger more discussion and bring more views onto the table.
Key research questions that were used during the interviews and few of the respondents statements that can be related more to this study is presented below.

RQ1 - Which aspects of the current way of working with requirements impact development speed?

Rigid requirements process forces early decisions.
Requirements-centric culture constrains development speed.

RQ2 - Desired way of working with RE

Facilitate learning through exploration.
Align requirements and automated testing.

RQ3 - To what extent will either aspects be addressed through the ongoing agile transformation.

Aligning requirements with automated testing, yes I strongly agree that we are trying to do this. /.../ We put a lot of effort on it and it's one of the key drivers in the agile transformation.
To help with solutions cutting across release trains. /.../ Architecturally, the idea is to form small teams to solve certain issues there and then. When it's solved [the team] dissolves.

DISCUSSION/CONCLUSION - Based on the results from the interview, the authors proposed some advise and changes with the existing agile methods that could speed up the development. Appreciable study with a suggested model and approach for future researchers to work on and present their findings. However, hypothesis as a result or theory outcome that has been generated after the study could have given the reader a highly qualitative study perspective.

REFERENCES - A good number of scientific articles and published journals has been used with relevant to to the study. Footnotes has also been included to give clarity to reader.All the references has been well cited in all sections of the study.

2.4.2 Critical review of a quantitative study

A dynamic variability management approach working with agile product line engineering practices for reusing features. (Kiani et.al., 2019)

This study has been designed to work with existing agile methodology in a software domain and intend to propose a new approach in correlation with existing agile roles like product owner, scrum master and events like review, daily stand-up and retrospective. On proposal of new approach, the authors have framed a questionnaire and sent across to respondents, Feedback on the basis of points has been evaluated and presented.

ABSTRACT - Gives the reader a crisp understanding of the subject and keywords also specified.

INTRODUCTION - Elaborate introduction with previous research and aim of the study. It gives the reader an understandable view of the existing process and the proposed model with its benefits as well as limitations of the study declared.

METHODOLOGY - The authors have well presented their reviews on their literature that has been used for this study with a good correlation to this topic has been written. But, the inclusion and exclusion criteria with the departments that have been involved would have given a clear focus to the reader. However, the materials that has been included in this study with the references needs to be appreciated.

RESULTS - Quantitative results has been explicitly presented with agile roles and events especially with the questionnaire at each stage. Two teams (AE and DE) has been included for the study, but when it comes to engineering practises, it would have been worthy to include diverse teams or justify the reason for including only teams that work on architecture. All the hypothesis that has been used in this study is presented below.

Multiple linear regression equation of the proposed research model is given by PA Performance= $\beta 0 + \beta 1v1 + \beta 2v2 + \beta 3v3 + \beta 4v4 + \beta 5v5$

where PA is the proposed approach, $\beta 0, \beta 1, \beta 2, \beta 3, \beta 4, \beta 5$ are coefficients and v1,v2,v3,v4,v5 are independent variables.

The hypotheses of this study are the following:

H1 - The feedback mechanism is positively associated with the APLE approach performance.

H2 - Commonality and variability are positively associated with the proposed APLE approach performance.

H3 - Customer involvement is positively associated with the performance of the proposed APLE approach.

H4 - Agile SPL architecture has a positive impact on the proposed APLE approach performance.

H5 - Early and continuous delivery is positively associated with the proposed APLE approach performance.

DISCUSSION/CONCLUSION - Purely quantitative study. Findings from the previous section has been evaluated based on a Likert scale and good number of variables used to test the respondents agreement level of the proposed approach. The usage of 'P Value' to compare the differences between the old approach and the proposed approach is one of the success factors for a good quality study. Hypothesis has also been presented from the findings and testing of each hypothesis given to validate the study. Calculation

of t test values at first stage of testing and further data analysis confirmed the hypothesis of one objective to find the interrelationship between the key activities as listed below.

H1a - The feedback mechanism is positively associated with commonality and variability.
H2a - The feedback mechanism is positively associated with agile SPL architecture.
H3a - Customer involvement is positively associated with commonality and variability.
H4a - Early and continuous delivery is positively associated with agile SPL architecture.

After the testing of each phase, analysis of the study was done to show the positive factors towards the proposed approach and the authors have used a good number of references to justify the achieved co-efficient value range and reliability of variables.It is shown in figure 5. Author of this paper has evaluated only the t-test values and P-values as the understanding of analysis of quantitative data is limited. Plans to gain an in-depth analysis and understanding of the same will be achieved hopefully before it is employed in the thesis work. One improvement could have been focused while evaluation - questions that were considered to be highly valuable to derive the hypothesis could have been highlighted.

Table 8 Linear regression analysis of research model

Model coefficient name	Model coefficient	Coefficient valuet value	
Feedback mechanism	β_1	0.33	2.36[a]
Commonality and variability	β_2	0.15	3.13[a]
Customer involvement	β_3	0.23	2.54[a]
Agile PL architecture	β_4	0.11	2.91[a]
Early and continuous delivery	β_5	0.34	2.03[a]
Constant	β_0	0.44	0.33[a]
R^2	0.90	Adjusted R^2	0.89[a]
F-ratio	42.19[b]		

[a]Significant at $P < 0.05$ [b]Significant at $P < 0.01$

Figure 5: Linear regression data analysis

REFERENCES - Throughout the study, references has been cited as and when required. A careful selection of scientific articles, conference proceedings and journals has been well used especially to show the justification of the results at each testing phase.

ETHICAL CONSIDERATIONS IN BOTH THE STUDIES - Authors of both the included studies has followed the ethical principles while conducting the study. While the organization name or research participants name was not to be found anywhere in the sections, it remained anonymous to the reader till the end. Although the department names were given in both the studies, the author of this paper finds it justifiable so that it opens up for future research in same sector.

2.5 Independent planning of Qualitative and Quantitative studies

Bryman strictly advises the students to follow the University guidelines while conducting a research project. This section has been written in relevance to the generic guidelines followed in Bryman(ref: chapter 4, Bryman). Some of the success factors that can be

taken into account while conducting a research project to produce a fruitful outcome are logged below.

- Research area and the focus on the subject needs to be well thought of to start with the initial phase of preparation.
- The next important step is to make frequent contact with Supervisors who are well versed in research process. Bryman strongly advises the student to the criticisms in a constructive and positive way to address the work deficit in the ongoing research. Students should take precautionary measures to not end up in vicious circle of the project being neglected and reexamined. This could be avoided by being transparent with the supervisor to explain about the obstacles running throughout the project at any point of time.
- Time management can be easily managed by devising an efficient timetable.
- Resource management should be looked upon by easy access to tools like Nvivo, SPSS, questionnaire tools and also the research target group.
- Research question can be derived from various sources like puzzles, new societal developments, social problem, theory or personal interest and experience. Whatever the source may be the research question should aim to approach social-scientific aspects.Precisely,formulation of the question can start with a generic search and then narrowed down.
- Now that the research question has been formulated based on the above step, it is very important to evaluate the same. Some criteria factors that could be considered are discussed further. The framed question should be clear, have a relationship between theory and research and researchable. Research question should neither be too broad or too narrow. In case of multiple questions, they should have be interlinked with each other.

Post completion of the formulation and evaluation phase, the research proposal should address the following areas.

- Research objectives
- Importance of the research topic
- A clear research question
- Literature review on research topic and research question(s).
- Data collection techniques and type of research methods.
- Why the chosen method is relevant to the research topic
- Resources usage and funds
- Milestones identified for the project.
- Anticipated problems at each stage.
- Ethical considerations

- Data analysis techniques

Preparing research and Results analysis - It is very important not to start the data collection until the research question is clear. While preparing for the research, pilot study might help to get a hold of the methods and analysis. The workshops listed in section 3 in this course paper forms a strong basis for future thesis work. Data collection and analysis process can be made easy by maintaining proper records, field notes and rather than memory. Familiarity with the hardware and software tools is an added advantage. A researcher need not wait until all the data is available for coding. As and when time permits, coding can be started while using SPSS tool. Data collection and analysis should be intertwined.

2.5.1 Ethical principles in scientific work

The main emphasis of this section is related to the ethical aspects to be followed between the researcher and research participant especially during the data collection and analysis phase. Of course, there are other ethical issues that may arise during the course of research Although, there exists professional associations who has well framed the code and guidelines, it is unsure about the potential reach for each studies. This can be guided by some autonomous principles(ref: Bryman. ch 6). Four main areas of ethical concern related to scientific studies are discussed further as indicated by Bryman(ref)

Harm to participants - A research that can inflict harm to participants in any form is unacceptable. Be it a questionnaire or an interview, it should not neither cause physical harm nor invoke emotional distress such as low self-esteem, stress and invocation of reprehensible acts.

Lack of informed consent - This is one of the features that needs to be focused more while conducting a qualitative study. But it might not be helpful during an ethnographic observation as the researcher covers a wide range of audience. It would be an exhaustible task to make an informed consent to each and every research participants. While for other type of methods, it might be used, few basic question that can be shared with the research participant is outlined below.

- About the research and it's purpose
- Research sponsor and their nature of involvement in research.
- Voluntary participation and duration.
- Withdrawal from participation in the research at any time.
- Preservation of data and data processing.

Invasion of privacy - This third area of ethical concern is the extent to which privacy breaches can be perpetrated. Many of us hold the right to privacy in high regard, and breach of privacy in the name of research are not tolerated. It's closely tied to the concept of informed consent, since when informed consent is granted based on a thorough understanding of what the study participant's involvement is likely to entail, he or she agrees that the right to privacy has been waived within that restricted domain. Even though the interview is held private, there are certain occasions when the researcher feels

the participant's refusal to answer questions that dig deep into their private realm such as religious beliefs, sexual practises , gender reveal, age and valuable assets like income.

Deception - When researchers present their study to participants as something other than what it was intended to, deception occurs. Researchers typically attempt to limit participants' understanding of the research so that they respond more naturally to the experimental treatment, hence deception in various forms is likely to be common in such studies. The ethical objection to deception appears to be divided into two categories. To begin with, it's not a polite thing to do. Although dishonesty is common in social interactions, it is not a welcoming thing. There's also the issue of professional self-interest to consider.If social researchers become recognized as snoopers who mislead people on a regular basis researchers' reputation especially in the field of sociology would have a negative impact. Such things could cause trouble obtaining financial support and the participation of future potential research participants.

According to Swedish Research Council (2017),ethics in research is a dynamic one. New ethical issues tend to arise when new scientific questions are posed, new methods are applied, and new materials are analyzed. Both the quality of the study and the researcher's honesty are demanded in research. One of the goals is to demonstrate that excellent research conduct in practice can entail challenging decisions between several options. The question is how one should conduct in a complex world where diverse beliefs and interests occasionally collide.Even though it is evident that research ethics encompasses questions about the relationship between research and ethics, as well as ethical standards for the researcher and the purpose and implementation of the research, the field of research ethics is not well-defined. It's impossible to condense all of this into a single definition. As research focus expands into new areas, new methodologies new types of questions emerge.

Relationship between good scientific quality and good research ethics (Swedish Research Council, 2017)

When assessing the overall quality of the research, no single quality may be overlooked. The aggregate traits of originality, external and internal validity, precision, and ethics are the parameters used for quality evaluation. As a result, there can be no conflict between the criteria for excellent research ethics and the expectations for good scientific quality. If a research report contains scientific flaws in the precision of its questions, uses incorrect methods (or incorrectly uses established methods), systematically excludes observations that do not support the author's hypothesis, handles dropout in a statistically unacceptable way, or the study design doesn't hold validity for the research question to be answered, it is considered unethical. Also, Ethics should not be an arbitrary choice rather a well-defined and pre framed guideline can help to project a good quality study.

Four concepts researchers can promise (Swedish Research Council, 2017)

1. **Secrecy -** Information can be covered by secrecy only if it is stated in law, normally the Public Access to Information and Secrecy Act.

2. **Professional secrecy -** Mostly applies to health care and social services. People who work or conduct study in this type of profession should adhere to professional secrecy.

3. **Anonymity -** Anonymity can be obtained by collecting information without identi-

fying specific people or a group. Another way is to remove the link between samples or questionnaire responses and a specific individual, so that neither unauthorised persons nor the study group can re-establish it. No one should be able to link a single piece of data to a certain person's identity. The code list can be obliterated.

4. **Confidentiality -** Researchers takes steps to protect the integrity of research participants as well as their right to privacy.

2.5.2 Quantitative Methods

Quantitative research strategy is a linear method of conducting a social research. Positivism and Objectivism are the respective epistemological and ontological considerations while using quantitative methods. The steps involved in conducting a quantitative research is outline in figure 6(Bryman, 2012).

Concepts and Measurement - Concepts can be thought of as a numerical points to link the theory and social research. The need to measure the concepts is to bring out fine differences and detect levels of variance, establish base to estimate the degree of concepts through correlation analysis and ensure consistency by using measurements. (Bryman, 2012)

Indicators - are direct or an indirect way to measure a concept and is used in less quantifiable data. It may be newly framed or already an existing one.Various indicators that can be used are Questionnaire, content analysis, statistics and recording individual behaviour (Bryman, 2012). Likert scale on the other hand is a measure of multiple indicator usually a five-point scale with maximum positive of 5 and a minimum negative score of 1. It can be a seven-point scale also depending on the context of study and research area.(Bryman, 2012).

Evaluating a Quantitative study - Measured concepts can be evaluated

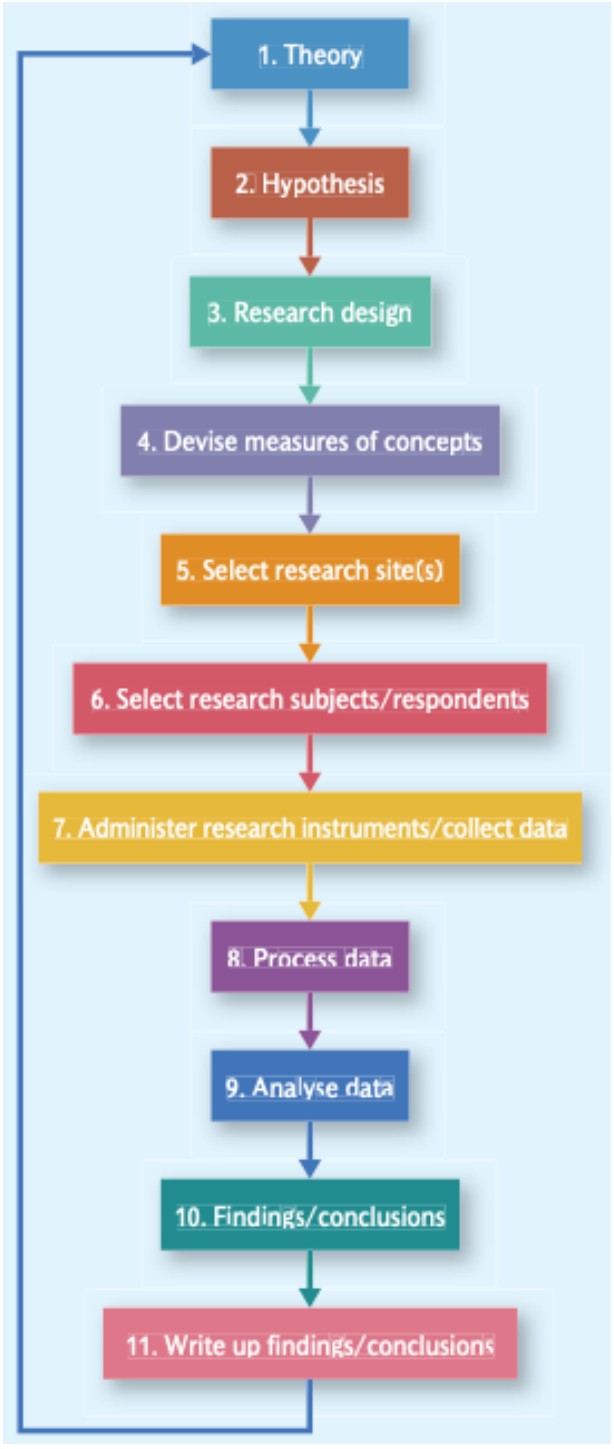


Figure 6: Process of quantitative approach (see figure 7.1 in Bryman (2012), p.161)

by

Reliability - Consistency in a concept can
be measured by finding a high correlation
between the tests conducted and the variables used.Stability, Internal reliability and inter-observer consistency are various methods to measure reliability (Bryman, 2012).

Validity - Evaluation criteria to check whether the indicator(s) set are gauged correctly to bring the real measure of a concept. Several measures of reliability are face validity , concurrent validity ,predictive validity , construct validity and convergent validity (Bryman, 2012).
Quantitative research is usually conducted in the form of surveys which can be administered through various modes.A structure has been outlined in figure (ref).

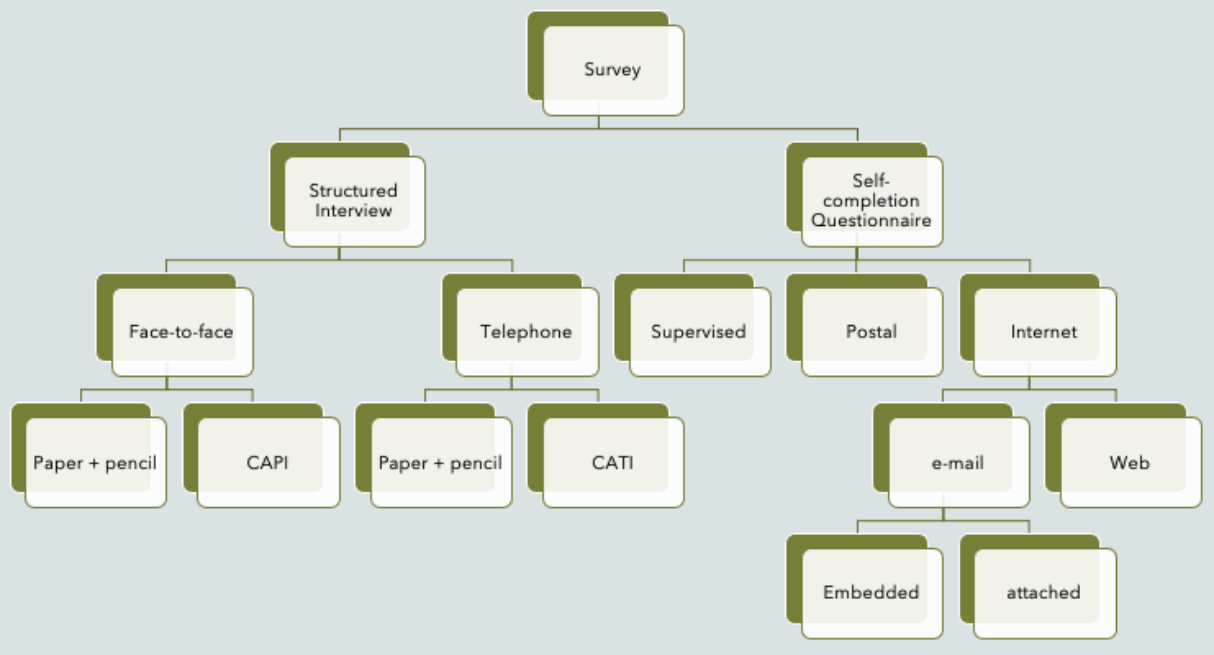


Figure 7: Different survey modes (see figure 8.2 in Bryman (2012), p.186)

Sampling in Quantitative study

- Population - can be referred to as units. Necessarily need not be only people, but can also refer to cities, organizations, nation,etc.
- Sample - Subset of selected population. Selection methods can be a probability or a non-probability approach.
- Sampling frame - List of all units that belong to a population selected from the sample.
- Representative sample - Accurate population from a sample.
- Sampling bias - Factor that can be used to distort the sample representativeness when members have little to no chance of being included.
- Probability sample - Random selection of sample with a representative sample as the outcome. Used to keep minimum sampling error.

- Non-probability sample - Non-random sample selection methods.
- Sampling error - Findings error aroused in research due to the difference between sample and selected population.
- Non-sampling error - Error in the research findings that arise due to the difference between sample and population that arise from deficits like poor questionnaire or interviews, inadequate sampling frame, sampling approach, non-response or flaw in data processing.
- Non-response -Non-sampling error that happens when members in a selected sample refuse to participate, non-contact and unavailability of their response data.
- Census - Broader term used in this context that refers not only to population enumeration but all data.

The author of this paper has not gained an in-depth knowledge and understanding of the types of probability and non-probability sample. But it can be assured that, type of sample that is relevant for the upcoming thesis work will be particularly studied and implemented.
Bryman (2012) shows four types of error that arise in a survey research.

1. Sampling error - This error arises because it is extremely unlikely that one will end up with a truly representative sample, even when probability sampling is employed.
2. Sampling-related error - Non-sampling error related to the sampling process that arises from activities linked to generalizability or external validity of findings. Examples - Inaccurate sampling frame and high non-response rates.
3. Data collection error - One type of validity error that arise due to factors such as poor questionnaires, structured interviews , interviewing techniques and flaws in measurement techniques.
4. Data-processing error - Incorrect data management especially during coding.

The author of this paper would like to present only about the self-completion questionnaire using Internet that was used during the workshop in accordance to the course literature. (Bryman, 2012).

Advantages of self-completion questionnaire

- Cheaper and quicker to administer
- Respondents convenience
- Absence of interviewer effects
- No interviewer variability

Disadvantages of the self-completion questionnaire

- No probing and prompting involved.
- Unaware of who is answering

- Number of irrelevant questions may tire the respondent sometimes.
- Difficulties faced by respondents when asking open type of questions.
- Lower response rate and risk of missing data.
- Language constraints unlike interviews.

To overcome the disadvantages, Bryman (2012) has showed few design strategies for a self-completion questionnaire.

- The presentation should be clear enough for the respondents to follow with clear instructions at the beginning.
- Questions and answers should be kept together.
- Right style of the chosen question format, either horizontal or closed.

Data analysis using IBM SPSS
Bryman (2012) has shown the basic steps to get started with SPSS before the statistical evaluation of data is performed.

1. Data should be entered in the data viewer.
2. Variables needs to be defined with proper names, labels and values.
3. Recoding of variables.
4. Computation of new variable.

Once the previously mentioned steps are completed, statistical view of the data can be seen by using Descriptive Statistics option in SPSS. Univariate analysis like Bar charts, Pie charts and histogram can be easily plotted for required data set. Other measures of central tendency like arithmetic mean, median and mode can be viewed. Range which is a measure of dispersion can also be analyzed. Bivariate analysis like Contingency tables, Pearson's r, Spearman's rho, Phi and Cramér's V, Comparing means and eta has not been discussed here as there was very little exposure with the pilot project during the workshop. One reason being improper design of questionnaire and other reason with very limited knowledge and understanding in the given timeframe as a naive student.

All the ethical aspects and considerations should be considered and followed while conducting quantitative research.

2.5.3 Qualitative Methods

As already mentioned, Qualitative research emphasizes on quality of data rather than the numbers involved. Theory and categories are the emergent products that arise from data collection and analysis. Three features that can be linked to qualitative study are inductivism, interpretivism and constructionism.(Bryman, 2012). An outline of the steps involved in conducting a qualitative research is shown in figure 8.(Bryman, 2012)

Bryman (2012) shows three methods of conducting a qualitative study discussed further.

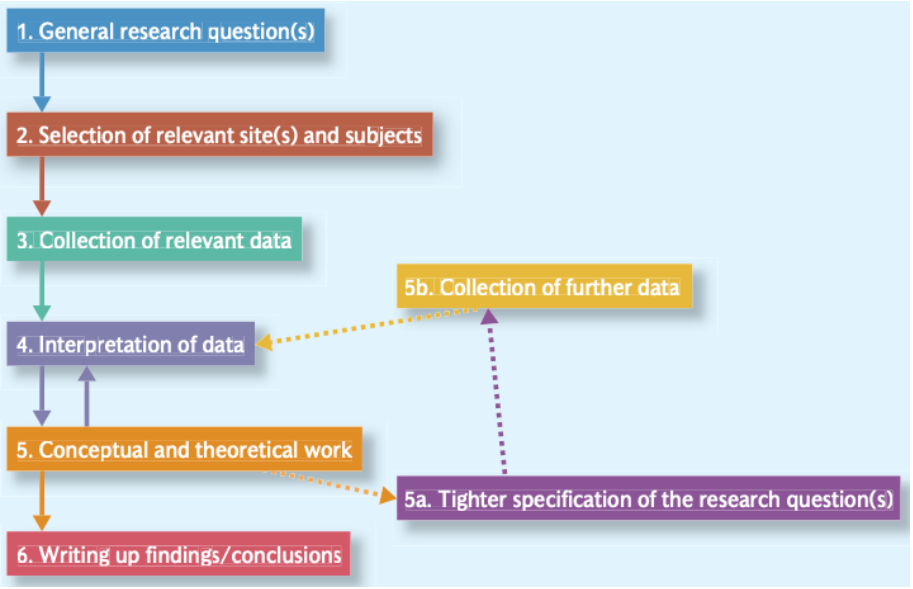


Figure 8: Steps involved in Qualitative research (See Figure 17.1 in Bryman (2012),p.384)

Ethnography/Participant Observation - Researcher is involved in a natural social experiment for a certain period of time. During this period, the participants behaviour is observed, conversations between the participants or with the field worker is listened. Either of one of the roles can be used while using this method.Ethical considerations also apply to this type of study.
Covert role - Participants are unaware of the researcher and usually used in open,public settings.
Overt role - Researcher is known to the participants and conducted in closed settings.

During an observation, the degree to which the participant is observed should be at an active level rather than passive. Three types of field notes can be used to make notes of the observation. (Bryman, 2012)

1. Mental notes - No physical objects involved, researcher uses his/her memory.
2. Jotted/Scratch notes - Brief notes written on piece of paper/diary. Later summarized and evaluated. Here, it is very important to make sure not to arise suspicion among the participants while writing field notes.
3. Full field notes - Detailed notes usually written at the end of the day or as soon as possible when the observation is complete.

Interview - This is widely used in qualitative studies as it involves an active communication between the researcher and the respondents.Unstructured interview and semi-structured interview are the two main types. The key differences between a structured (quantitative) and qualitative interview is listed below.

- Approach in structured interview ensures maximum reliability and validity of the study, whereas qualitative interviews emphasize on perspectives of the interviewees'.
- Flexibility follows with the order of questions, words can be used interchangeably in qualitative interviews while in quantitative, it is more structured, hence inflexible.

- Expectation of rich and detailed answers in qualitative interviews gives an option to use the respondents more than once, but in quantitative unless it is really required, respondents are used only once.

Bryman (2012) has shown an interview guide (Figure 9) which helps researchers to conduct a successful interview. Also, for naive social researchers, conducting pilot interviews can be useful not only to understand the process but how to be a good listener and make the most out of it. It is also essential not to follow a Question1- Response1 - Question2-Response2..but Question1 - Response 1 ..... Question 2 - Response 2..... - ...Silence is an important attribute that can be practised to keep the conversation healthy and informative.

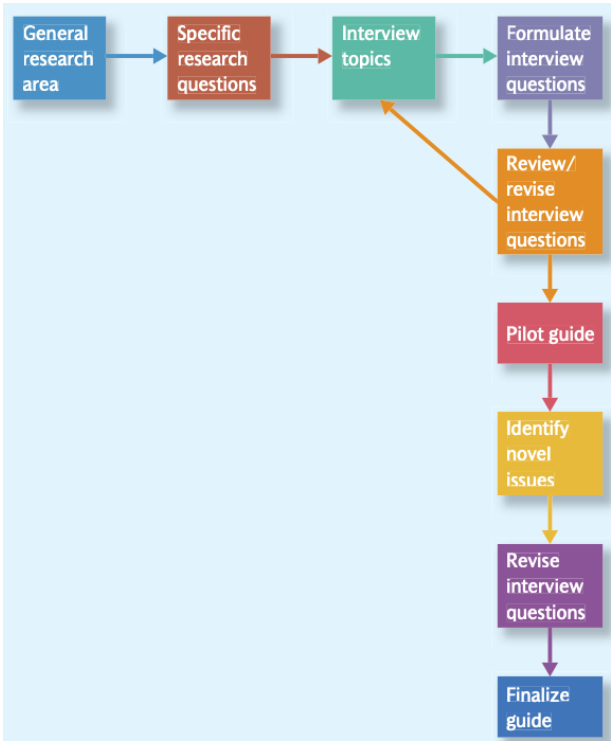


Figure 9: Interview guide to formulate questions (see figure 20.1 in Bryman (2012), p.476)

Purposive sampling - is a type of sampling that is not based on probability. The researcher has no intention of selecting research subjects at random. Purposive sampling's purpose is to strategically sample cases/participants so that those sampled are relevant to the research questions being asked. Frequently, the researcher will want to sample to guarantee that the resultant sample has a considerable lot of variation, so that sample members differ in terms of important traits relevant to the study issue. Purposive sampling does not allow the researcher to generalize to a population because it is a non-probability sample method.A purposive sample is neither a convenience sample nor a random sample. A convenience sample is one that comes to the researcher through accident, whereas purposeful sampling is done with the researcher's study goals in mind. Purposive sampling selects sites within sites, such as organizations and persons (or whatever the unit of analysis is) based on their relevance to the study objectives. The researcher must be clear in his or her mind about the criteria that will be used to determine whether or not units of analysis are included or excluded (whether the 'units' are places, individuals, or something else). Theoretical sampling and snowball sampling are two examples of purposive sampling in qualitative research.
Bryman (2012) also shows different kinds of questions that the interviewer can use during an interview. Some of it are introductory, direct and indirect questions, probing questions, specific questions and interpretative questions.

To sum up, it is a five step plan to be followed for a qualitative study.(Maria spante)

1. Who to talk to and why
2. Preparing the interview guide

3. Time and place booking (Face-to-face, online, telephone)

4. Data capturing (Use of online tools, mobile phone, recorder)

5. Data analysis (NVIVO)

Evaluation criteria of a qualitative study: Bryman (2012) argues that Trustworthiness is one of the primary criteria that helps in evaluation. it is made up of four noteworthy criteria as follows. This applies to quantitative research as well.

1. Credibility - The credibility of findings is established by ensuring that research is conducted in accordance with accepted research practices and by presenting research findings to members of the social world who were examined for validation that the investigator has accurately understood that social world.

2. Transferability - A detailed description provides others with a database from which they can make decisions about the transferability of findings to different environments.

3. Dependability - This requires keeping thorough records of all aspects of the research process, such as problem formulation, study participant selection, fieldwork notes, interview transcripts, data analysis decisions, and so on, in an easily accessible format.

4. Confirmability - The researcher can be proven to have behaved in good faith; in other words, it should be obvious that he or she has not explicitly allowed personal beliefs or theoretical preferences to impact the research's conduct and conclusions.

Focus Group - This is another method of conducting a qualitative interview where the sampling process, interview guide and evaluation criteria are the same to be followed mentioned in the above section. The only difference is that it involves a group of respondents (interviewees) and involvement of a moderator/facilitator to lead the interview. The facilitator should lead the discussion but need not be too intrusive. Use of common ground creator like a picture or an object can help to lead the discussion and strengthen the arguments. Each interviewees in a group should equally participate and contribute which adds beauty to the study, thus covering various aspects with different perspectives.

All the ethical aspects is a necessity to be followed while conducting a qualitative study.

3 Workshops

3.1 Workshop 1 [2]

This workshop was conducted during the first week of the course focusing on Epistemology. Much of this workshop focused more on specifitivity.(ref: lecture slide) Formal models which serve as building blocks for design of Information Systems (IS) uses methods

[2]Prof. Dr. Alfred Holl, Georg Simon Ohm University of Applied Sciences, Nuremberg, Germany , February 23, 2022.

of empirical science. This involves observation, abstraction,induction and type construction. The constructed formal models using any of the design methods in one way form a scientific knowledge. This needs to be examined with the help of Theory of knowledge (Epistemology). This can be achieved through

- Acquisition by cognitive methods
- Relate the model with reality by examining the nature and quality of the model
- Limitations of the acquired knowledge provided by truth and correctness factors.

Information Systems by itself can be considered as an empirical science based on the common features of the knowledge acquired methods such as observation, modeling and formalization. However, there exists a finite line of comparison between natural science and IS which makes IS not to reach the level of natural science. This way of epistemological approach and results acquired from natural science gives way for knowledge transition to Information Systems wisely.

Mayeutic cycle

Knowledge is gained through an iterative, circular process called the Mayeutic[3] cycle as shown in figure 10. It involves two phases, model construction and model testing by induction and deduction respectively.

The analytic phase is inductive-empiristic which means observation data is evaluated, interpreted and a model or theory is identified or modified. Synthetic phase is deductive-rationalistic which means Experiments are prepared to test and verify the predictions from the model. Then, the experiments are executed and observed data is gathered. This data is again analysed, compared and the cycle continues.

It can be strongly argued that the analytic phase measurement of truth is knowledge and interpretation while in the synthetic phase, truth can be measured by intelligence.

[3]comes from maieutikos,Greek word for "of midwifery". In this context, it is Socrates technique of bringing new ideas by reasoning and dialogue which was previously latent.

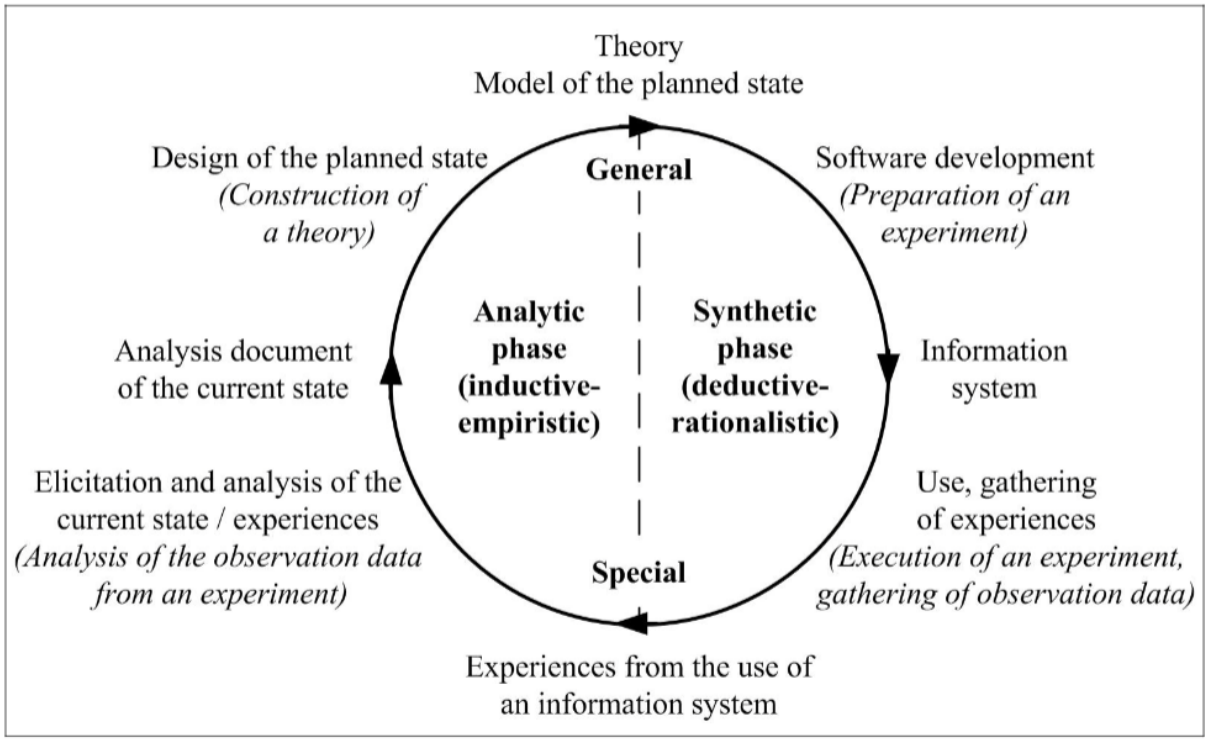


Figure 10: Mayeutic cycle

Three different tasks were given to each groups. A presentation of the same preceded by a discussion among group members was encouraged.All the above mentioned factors was completely analyzed, discussed and presented throughout this workshop with the help of a prepared questionnaire briefly discussed as follows.

1. **Question 1:** Isomorphy and differences between real earth and globe model.
   - Find the most important differences between a globe (model) and the earth itself (reality).
   - Find the most important differences between data/process models and the underlying organization.
2. **Question 2:**Differences between various objects of cognition regarding their suitability for formal modeling.
   - Find two objects of cognition in the natural sciences which can be modeled with small difficulties and two other objects which confront with big difficulties.
   - Find two objects of cognition in IS (departments of an organization) which can be modeled with small difficulties and two other objects which confront with big difficulties
3. **Question 3:** Multi-perspectivity - Different views of model designers on the same object of cognition, their undesired effects and their harmonization
   - Comparison between Tycho Brahe‘s (1546–1601) and today‘s model of solar system.
   - Find two situations with undesired effects of multi-perspectivity when you model an organization (tree swing cartoon - project management). Find suggestions how you can harmonize the different perspectives.

3.2 Workshop 2[4]

While the previous workshop was more about specifitivity, this workshop was concerned about 'how to be more specific while conducting a study'.This workshop was conducted in two sessions to help students in an efficient way to search literature related to a specific topic and write the same. The first session covered on the article search techniques and the second session covered on proper referencing using Harvard style.

Session I : Article search technique

- Step 1: Find your area of interest and frame a suitable title or research question.
- Step 2: Pick the relevant subject term and use as shown in the given below table 11. Now, write the related synonyms of each subject term either with the existing knowledge or using 'synonyms.com' and 'thesaurus.com'.

Research Question				
Subject term from RQ:				
Synonym or related term:				
Synonym or related term:				
Synonym or related term:				
Synonym or related term:				
Synonym or related term:				
Synonym or related term:				
Synonym or related term:				

Figure 11: Subject terms and synonyms from the research question

- Step 3: Here comes the most important step. With the given subject terms and synonyms, use it to find the related articles in the database through the university's library website. The keywords used can be used as such or with truncation character '*' at the end of each word for automatic fill of related words while search. For example - when the word child is filled as 'child*', the database searches with children, childish and childhood,etc..,
- Step 4: When more than one keyword is used in a search term, it is now important to link the search terms using boolean operators.
  Let Search term 1 be ST1, Search term 2 be ST2, and their related synonyms for each search term be represented as synonym 1 (ST1SYN1), synonym 2 (ST1SYN2) and ST2SYN1,ST2SYN2 respectively. Boolean Operator 'AND' can be used as a link between search terms, while 'OR' can be used to link the synonyms. Usage of AND results in a decreased count while OR yields a relatively higher count of articles.

[4]Elisabeth Näverå, Librarian Högskolan Väst, Trollhättan, February 24, 2022.

Step 3 & step 4 can be explicitly written as

'(ST1 OR ST1SYN1 OR ST1SYN2 OR ST1SYN3) AND (ST2* OR ST2SYN1 OR ST2SYN2 OR ST2SYN3) AND (ST3 OR ST3SYN1 OR ST3SYN2* OR ....) AND (...)'*

- Step 5: With the obtained result, now the filter criteria can be obtained to narrow down the search and get an ideal number to make the reading feasible. Some of the notable filters related to this course is as follows.
  - Language: English
  - Date: custom range
  - Article: Peer reviewed(verification by researchers in the same field)
  - Subject term: select the right term(s)
  - Thesaurus term: choose the right term(s)
  - Department: IT/ Computer Science/ etc..,

Along with the search techniques, difference between articles, reports, conference paper, books, dissertations and thesis was explained for better understanding. The structure of a good scientific paper was also introduced. Based on the above search technique, two scientific papers has been selected for qualitative and quantitative study. Critical review for these papers has been provided in section **??**

Session II : Using references the right way

Now that, the papers have been finalized to study and review, it is important to follow the structure with the related context and refer these papers in writing using proper reference guide as prescribed by the University guidelines. Any text that will be included in the writing has to be an understanding or interpretation of the text that is read and should not be just written as it is in the selected articles. This way 'Plagiarism' can be avoided. In case of using quotes, tables or diagrams, reference guide has to be followed. Even though, automatic referencing tools like Mendeley, Zotero can be used for citations, it is important to check manually whether the published year, title, type of article, volume number, pages with from and to range, available database, DOI(digital object identifier) and accessed date in the reference is right. Some important guidelines to be followed while using Harvard style reference are listed below.

- For an electronic article, the format is 'Author's last name, first name initial. (year of publication). Title of the article. [Electronic] Title of the journal, Vol(number),pp (xx - xx). doi:xx.xxxx/xxxxxxxabc.yyyy.xxxxxx Available: Name of database.[Accessed: dd mmm yyyy]'
- References should always be given at the end of the paper in alphabetical order.
- All the cited sources used within the text of the paper should be added in the reference list except for oral sources.
- No sections within the references is allowed.
- It is always the author who needs to be credited.

3.3 Workshop 3[5]

This workshop was organized as a group activity to use the quantitative methods while conducting a social study. The activities written further in this section were preceded by respective lectures. A short lecture on the usage of quantitative method and feedback/reflections on why and what form of Quant methods were used in their thesis work, how it proved to be efficient especially during the COVID-19 Pandemic was given by two students who completed this course during the previous year.

- **Activity 1 -** Form groups and read scientific papers which involved quantitative methods. Understanding of these papers and review was performed.
- **Activity 2 - Data collection:** Prepare a questionnaire related to a social study. The questionnaire was supposed to be filled by the same group and passed among other group members also. The topic that was involved during this phase was to analyze the 'Prevalence rate of cyberbully victims among adults in social media'. Questionnaire was prepared in a way such that, the respondents details were anonymous to the researcher.Being a sensitive topic, no questions relating to gender and invoke emotional trauma among respondents were not involved. A few questions that has been asked in the questionnaire is listed below.

  Question 1 - The frequency of social media usage.
  Options: Never, Daily, weekly, fortnight, monthly

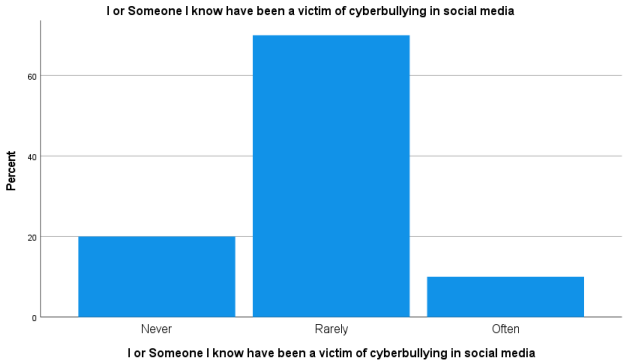
  Question 2 - I or Someone I know have been a victim of cyberbullying in social media.
  Options : Never, Rarely, Often, Frequently

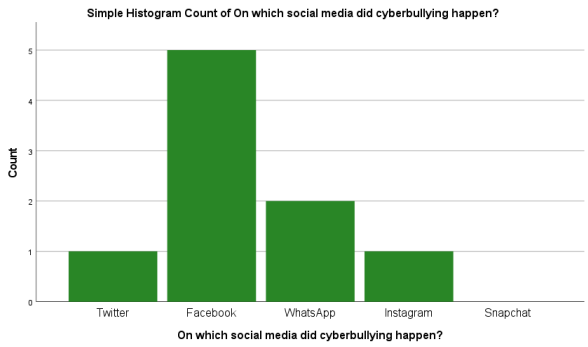
  Question 3 - On which social media did cyberbullying happen?
  Options : Facebook, WhatsApp, Instagram, Twitter, Snapchat, Others

  This was also an opportunity to use the tools like Question Pro and Microsoft forms to prepare the questionnaire. The number of responses and reflections upon this group activity were presented.
- **Activity 3 - Data processing and analysis** Now that the data has been collected, analysis of the same was done using SPSS tool. The collected data was fed and recoded for few questions to have a statistical analysis. Upon completion of this step, Descriptive statistics were used to show a graphical view of the results using histogram, box plot and scatter plot. Mean, Standard Deviation and Range for the given data were also examined. Some of the charts that gave a correlation between the social media and cyberbullying frequency are shown below in figure 12.

  Presentation and reflection of this activity was carried out with observation and review among peers also.

[5]Daniel SjÖlie, Lecturer, Department of Informatics, Högskolan Väst, Trollhättan, February 28 - March 04, 2022.





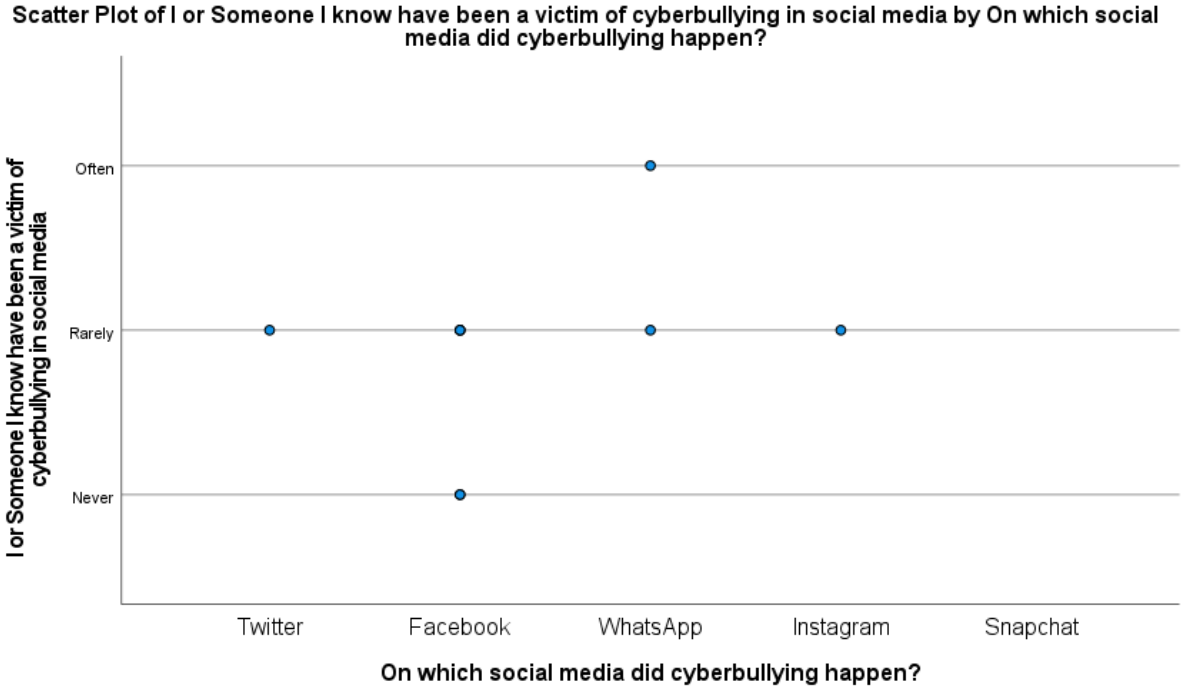


Figure 12: Descriptive statistics of quantitative data collected

3.4 Workshop 4[6]

Focus on qualitative methods along with two social studies was carried out during this workshop as a group activity preceded by respective lectures. It is listed below.

- **Ethnography(Observation):** A Covert observation was done to conduct a study on 'Usage of automatic hand sanitizer in the University' was carried out. Jotted notes were used during the study and the qualitative aspects such as user behaviour, factors of usage and non-usage were presented. To sum up, some of the data analysis during the observation is shown below.

  'Out of two students who exited the campus via the exit door, one student used a dispenser and opened the door. Other student just opened the door. It appeared as a casual conversation between both of them'

[6]Maria Spante, Senior Lecturer, Docent, Department of Informatics, Högskolan Väst, Trollhättan, March 07 - March 11, 2022

'One student used the automatic dispenser at the entrance near I block while exiting the campus, although he had a mobile phone in his other hand and was conscious enough to disinfect his hands and leave the campus.'

'One young girl enters, in one hand she has a bag and in the other, she's texting with the smartphone, she does not use the hand sanitizer. One middle-aged woman uses the exit and she does not use the sanitizer.'

'Everybody was going in or out as a group, discussing some topic and not paying attention about the surrounding area such as sanitizer.'

'More people were leaving the building than entering. Two girls used sanitizer while leaving in a group. It was a bit of social pressure, as one of them used a sanitizer, so the other stopped as she saw it and used it.'

- **Interview:** This study was carried out based on a status report involving the digital tools usage among schools in Munkedal municipality. A oral, semi-structured interview was conducted online via zoom with the interviewee being an alumni student. Two questions were in focus throughout the study.'Usage of digital teaching aids among students to make learning interactive, fun and also help to improve their grades','Reasons/Factors on insecure feelings by teachers using the digital tools'. The conversation was recorded with an informed consent to the interviewee and transcription of the same by 'Otter'. Qualitative aspects regarding user behaviour, opinion, awareness, improvements and factors that lead to more/less usage and non-usage of the digital tools were studied. Some of the questions that were asked during the interview is listed below.

  Q1:Based on your experience with the above tools mentioned, which tool do you think is user-friendly?
  Q2: What do you think is the reason that teachers feel insecure while using the systems?
  Q3: What do you like/dislike about the current systems?
  Q4: Do parents' interaction with the system have enough knowledge and training modules to get result-oriented performance for pre-school pupils?

- **Focus group:** 'A qualitative study and analysis on the preference of coffee or energy drinks in work, study and party environments among University students' conducted as a part of focus group study. It was on oral, semi-structured and face-to-face interview with 3 research participants. Data capture was done using an i-phone and transcription via Nvivo. A facilitator led the discussion with a hard copy of three environments as a common ground creator. Some of the interesting questions that were asked to the respondents are given below.

  Q1: Do you think it improves your focus or capacity to study more/better?
  Q2: Do you take it because of the taste or for the benefits?
  Q3: Does AD FACTORS influence your intake or change ?
  Q4: Most preferred drink in their respective countries.

It was an interactive and fun study with active participants where a good number of social aspects was revealed.A few to list.

- Tea was the most preferred drink among one participant.
- It is always coffee as the priority among one participant with reason being unknown! (Coffee is a part of daily routine)
- Preference to just water and fruit juice during travel or party time among one participant but like to have coffee during fika.
- All the participants were given an instant choice to select the drink and it was coffee that topped the charts.

So, there were many factors that triggered the discussion among the participants during this study. A lot of cultural aspects was also brought to table.

3.5 Reflection upon ethical aspects

Throughout the workshops conducted, ethical code of conduct as specified in the course literature has been followed. While conducting the interview and focus group sessions, the interviewees were well informed about the recording and that they can interrupt at any point of time when there is an uncomfortable situation. All the data transcription that was done was shared only among the group members and the participants name were masked while sharing a part of it during the presentation also. This is very important to be adhered with, as it develops confidence among research participants and not be an emotional buster. The field notes that were captured during the observation did not have any information about the name, gender, age and role of the participant, be it student ,tutor, administrative staff or house keeping staff.Only the participants behaviour were taken into consideration.Also, while conducting this as a covert study, none of the group members were sneaky enough to create a state of confusion or suspicion in the environment where the study was carried out.The same measures were taken for quantitative studies as well. No questions pertaining to participants gender, name or email were asked while filling the survey. Although, the results were shared only between the fellow students and supervisor, the questions were designed in a way enough to capture the highest level of anonymity.

All the workshops conducted as a part of this course was a learning phase and review of other group's activities opened doors to be well prepared to face any questions and address the same for the upcoming thesis work. This was also an opportunity to take the criticism in a constructive manner and gave way for self-improvement.The author of this paper wanted to address this as a progressive factor for current and future education, be it in career development also. Some of the key takeaways during each workshop and presentation has been presented in table 3 below.

Key takeaways
Workshop 1
Ideas need to be concretized. When a task is given, look for simple things and focus on topic, don't complicate and deviate. Higher the time given, higher the demand. Quality of the document/slides needs to be perfect.Just in case , the slides needs to be reproduced even after a year, the content need to be in a reconstructable manner.
Workshop 2
As important it is to write a paper, so is the usage of references the right way. It is quite a boring task but comes by practise. Reference guide should always adhere to the place of publication and writing. Never replace a technical keyword with synonym (For example: Blockchain, DevOps cannot be replaced by synonyms.
Workshop 3
The number of questions or participants while conducting a study doesn't matter. The questionnaire should be good enough to make the participants involved. This gives way for good data analysis.
Workshop 4
It is important to be unbiased while conducting a qualitative study. Researcher is the main tool to design and capture data. A qualitative study can easily be turned into a quantitative study when the qualitative aspects as a fine line of demarcation is not followed. Failures are beautiful. What is important is the lesson learnt and not worry too much only about the success factor.

Table 3: Key takeaways of the organized workshops

4 Conclusion

A problem to be solved or a question of interest is the starting point for a social research. The theory created should be based on the nature of the problem and the questions addressed. Whether the questions are worth asking should be weighed against the current state of knowledge in the field. With the help of this course learning outcomes and practical knowledge gained through workshops, the author of this paper believe that, this course paper can provide maximum inputs for the upcoming thesis work to present a good quality scientific paper with the relevant methods, theory, hypothesis and good ethical principles. Also, this course paper was written using Pareto's principle[7] (20% efforts every week to achieve 80% results at the course end) and the same shall be followed while writing the scientific paper for thesis project in Informatics.

[7]https://en.wikipedia.org/wiki/Pareto_principle

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