

# TAKING THE MYSTERY OUT OF INTERPRETIVE RESEARCH: CROSSING THE INFINITY APPROACH

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**ABSTRACT**— Students doing their fourth year studies in Information Technology are making a transition from undergraduate studies to post-graduate studies. An honours project is done over a full year and used to assist students in making this transition. At the onset of the project, students are prepared through lectures and small-step assignments to formulate a problem and understand the philosophical paradigm underlying their particular study. They are also guided regarding research methods applicable to the four prominent Information Systems paradigms, namely positivistic, interpretive, critical social theory and design science research. After their initial preparation, students are introduced to the fields of expertise supported by Information Technology academics at the institution. They are then allowed to approach a study leader with a topic – to be guided through the project. Although the preparation of students has been expanded over a period of time – to accommodate the shortcomings students have, student still struggle with some key research concepts. One of their difficulties includes interpretive research methodologies. This paper suggests an approach to interpretive research that may assist young researchers. A simple hypothetical example is used to guide students through the process of conducting interpretive research using Grounded Theory.

**Keywords:** Interpretive research; Qualitative data, Data collection, Data analysis, Infinity approach

## 1. INTRODUCTION

Interpretive research is one of the most daunting research methodologies to undertake (Migiro & Oseko, 2010; Schwartz-Shea & Yanow, 2013). This is mostly due to the non-numeric nature of qualitative data that needs to be gathered for an interpretive study. This paper explores and introduces Grounded Theory as a method to gather and analyse research data. In addition to addressing the approach that was coined Grounded Theory by Strauss and Corbin (1990) by making it visual to students; it has a built-in reference to most of the validation principles suggested by Klein and Myers (1999) in their article “*A set of principles for conducting and evaluating interpretive field studies in information systems*”. The suggested technique keeps the young researcher in mind and attempts to assist them in their research endeavour.

In subsequent sections background regarding post-graduate studies at the North-West University (NWU-VTC) is provided, which is followed by the literature review on interpretive research. The infinity approach is then introduced along with an appropriate example to provide clarity with regards to the implementation of the approach. The paper concludes with recommendations that can support students in their understanding of interpretive studies.

## 2. BACKGROUND

At the NWU-VTC, post-graduate honours students undertake a project comprising two subject modules in their course. This is in addition to eight Information Systems subject modules that form part of the curriculum. The project is used to demonstrate the student's research competency and is completed over a full academic year. Students attend various classes preparing them for the project, including academic writing, research paradigms, research methods and how to gather quantitative and qualitative data. Students are then introduced to the fields of expertise supported by IT

academics at the institution. This step prompts students to approach a study leader with a topic – to be guided through their project. The researchers, who act as project study leaders to a number of honours students, found that students struggle with various aspects regarding research and that even those opting to continue with their studies, struggle to come to grips with research methodology during their master's studies.

With the introduction of the four paradigms prominent in Information Systems, namely positivistic, interpretive, critical social theory and design science research, it is found that students' graduate studies prepare them well for some paradigms and not so well for others. With their scientific background positivistic research falls within their frame of reference and their statistical subjects prepare them for analysing such data. Since they were exposed to developing systems during their graduate course, they find it fairly easy to make the transition to creating artefacts which is the essence of the design science research paradigm. When it comes to the interpretive and critical social theory paradigms, students have no frame of reference to build new knowledge on. Although subject modules in systems analysis and design relates to these paradigms, it is found that the data gathering and accompanying data analysis employed by these two paradigms are difficult for students to understand and implement. Although the departing point of the interpretive and critical social theory paradigms differ, with the former being to *understand* and the latter to *change*, both make use of similar techniques to gather data and then analyse it. This reason motivated the researchers to find a structured approach that may guide them to gather and analyse interpretive data.

### 3. INTERPRETIVISM AS A PARADIGM

Interpretivism as a paradigm developed from Positivism to address the latter's limitations. Interpretivism, which was introduced by Dilthey during the 1800's (Hughes & Sharrock, 1997; Takhar-Lail, 2014), posit that it is important to understand the differences in humans' roles as social actors (Saunders, Lewis, & Thornhill, 2009). This paradigm is mostly employed by social science researchers, as opposed to Positivism, which is mostly applied by the natural scientist. In essence, Interpretivism probes beyond facts towards meaning (Noor, 2008). The emphasis is placed on conducting research among humans, instead of conducting research on objects such as computers (Saunders et al., 2009). The goal of Interpretivism is to understand. Gathered data is used in order to develop a theory – which is supported by the data. Narratives, which are qualitative in nature, are mostly used in interpretive research.

The metaphysical assumptions (Myers, 2011) of Interpretivism include:

- **Ontological** assumptions which comes from the nature of our being, it verbalises existence and focuses on the researcher's view on reality. The interpretivist access reality through social constructions like language and its shared meanings.
- **Epistemological** assumptions that look at the nature of knowledge and how knowledge relates to truth, our beliefs and how we justify knowledge. The interpretivist attempts to understand a particular situation through the meaning people assign to it.
- **Axiological** assumptions take aspects that the researcher believes to be of value regarding a situation, into consideration. The interpretivist's contextual understanding of a situation drives the research.

To ensure that interpretive research is done in a way that is valid and trustworthy, Klein and Myers (1999) compiled a list of seven principles to support such research. Principles are grouped in four groups, namely:

- one *fundamental* principle (hermeneutic circle);

- two *critical reflection* principles where the research needs to be placed in context and the relationship between the researcher and participants need to be reflected on;
- A principle based on the *philosophical framework* where the hermeneutic circle and the context are applied to the data to enable the researcher to generalise and abstract the data; and
- Issues that should be treated sensitively, including interpreting data that may contradict one another to tell one story, participants having different interpretations and the researcher suspecting distortions that may be corrected by including more participants.

The four groups with the seven principles are presented in Table 1.

**Table 1. Principles of interpretive research (Klein & Myers, 1999)**

| Group                   | No. | Principle   | Explanation  |
|-------------------------|-----|---|--|
| Fundamental             | 1   | The fundamental principle of the <b>hermeneutic circle</b> .                      | All human understanding is achieved by iterating between the interdependent meaning of the parts and the whole they form. This principle is <b>fundamental</b> to all other principles.  |
| Critical reflection     | 2   | The principle of <b>contextualization</b> .                                       | Requires <b>critical reflection</b> of the social and historical background of the research context, the audience should be able to see how the situation under investigation emerged.   |
|                         | 3   | The principle of <b>interaction</b> between the researchers and the participants. | Requires <b>critical reflection</b> on how the data were socially constructed through interaction between the researcher(s) and participants.  |
| Philosophical framework | 4   | The principle of abstraction and <b>generalization</b> .                          | Requires relating the idiographic details revealed by data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social interaction. |
| Sensitivity issues      | 5   | The principle of <b>dialogical reasoning</b> .                                    | Requires <b>sensitivity</b> to possible contradictions between the theoretical preconceptions guiding the research design and actual findings during subsequent cycles of revision. The data needs to tell a story.                  |
|                         | 6   | The principle of <b>multiple interpretations</b> .                                | Requires <b>sensitivity</b> to possible differences in interpretations among participants as are expected in multiple narratives or stories of the same sequence of events under study.  |
|                         | 7   | The principle of <b>suspicion</b> .   | Requires <b>sensitivity</b> to possible “biases” and systematic “distortions” in narratives collected from participants.   |

The set of seven principles compiled by (Klein & Myers, 1999) is inter-woven with the Grounded Theory steps outlined by (Strauss & Corbin, 1990) in a visual method to make it easier for young researchers to apply the technique.

Table 2 represents the steps to be followed in a project conducted in the interpretive paradigm by using Grounded Theory.

**Table 2: Approach for the Grounded Theory Research Tradition summarised from (Strauss & Corbin, 1990)**

| General STRUCTURE of a project | STEP                                     | Explanation   |
|--------------------------------|--|---|
|                                | Introduction                             | State the problem   Ask questions   |
|                                | Research procedures                      | Grounded theory   |
|                                | Data collection                          | Interviews, or other data   |
|                                | Analysis                                 | Making sense of the data – several sub-steps  |
|                                | Open coding                              | Researcher forms categories of information; each category may be sub-categorised , sub-categories are called properties which form dimensions |
|                                | Axial coding                             | Interconnecting categories; where a central theme is identified with possible conditions influencing the central theme                        |
|                                | Selective coding                         | A story integrating the categories from the axial coding model is written; the researcher may support it using a diagram                      |
|                                | Conditional matrix (not always included) | Focus on the social, historical and economic conditions influencing the theme researched  |
|                                | Discovered theory                        | A theory is generated in relation to a particular situation; the theory may be subjected to further empirical testing                         |

The data gathering step includes the techniques of data gathering, such as interviews, questionnaires, observations and using documents (Oates, 2006; Saunders et al., 2009) and ensures interaction between the researcher and participants (*principle 3*).

The data analysis step includes Grounded Theory and other qualitative data analysis processes such as tabulation (Botes, Goede, & Smit, 2014) and software specific analysis tools including Hyper Research (ResearchWare, 2013) and Atlas.ti (ATLAS.ti, 2014) may help with abstraction and generalisation (*principle 4*).

With data gathered from interpretive research it is of no use if it is not analysed and studied to represent meaning. Therefore a look into qualitative data analysis is needed to gain understanding about the process of adding meaning to data. This is achieved by looking at each individual aspect of the data and also at the data as a whole. The principle of the hermeneutic circle (*principle 1*) is the fundamental principle and forms the basis for research methods used in interpretive research. The hermeneutic circle implies that the researcher gain understanding by investigating the whole situation as well as the investigation the parts thereof (Burrell & Morgan, 1985; Klein & Myers, 1999). Along with this fundamental principle, the principle of contextualisation is important when attaching meaning to data (*principle 2*).

Interpretive research is an on-going or iterative process (Schwartz-Shea & Yanow, 2013) until the research reaches a point of understanding or saturation. This implies that when new data is gathered and the data does not provide new insight into the problem, but only validate what is already known about the problem. The researcher should expect multiple interpretations among participants, much like an accident on the road that will be verbalised in different ways by different onlookers (*principle 6*). The researcher also needs to be sensitive to the fact that participants may contradict one another, which will require the researcher to make sense of the data – to ensure that

a story is told (*principle 5*). Up to such a point, the researcher should anticipate more aspects to emerge from the data (*principle 7*).

Qualitative data used by interpretive research is analysed using qualitative data analysis techniques. The qualitative data analysis process is defined by Bogdan and Biklen (1982) as:

*“...working with data, organizing it, breaking it into manageable units, synthesizing it, searching for patterns, discovering what is important and what is to be learned, and deciding what you will tell others.”*

The placing of raw data into logical, meaningful units of information requires some creativity in the process of qualitative data analysis (Hoepfl, 1997). This process of qualitative data analysis consists of three stages:

- the identification stage,
- the re-examination state, and
- the translation stage.

Hoepfl (1997) explains that regardless of the fact that these stages are linear, they may occur simultaneously or repeatedly. He also states that further data collection may occur during any stage should gaps be found within the data.

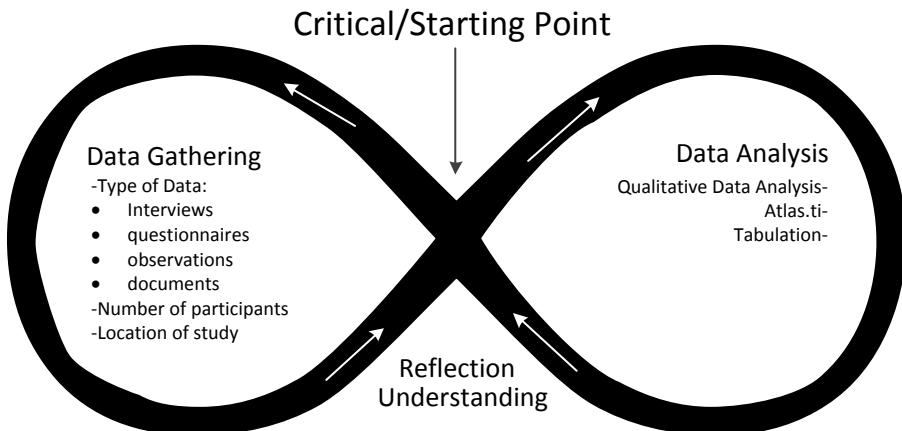
The process of qualitative data analysis begins with the identification stage – meaningful themes that emerge from the raw data (Hoepfl, 1997). Strauss and Corbin (1990) refer to this process as '*open coding*'. The process of open coding involves the identification and the naming of conceptual themes by the researcher. The situation observed will be grouped into these themes. The goal, according to Hoepfl (1997), for theme identification is to “create descriptive, multi-dimensional categories which form a preliminary framework for analysis”. He also recommends that researchers devise an ‘audit trail’ by linking data chunks to participants and also to the context of the research. The next stage of qualitative data analysis is the re-examination stage. During this stage, connections between the identified themes are determined by means of re-examination (*ibid*). This is a complex process developed by Strauss and Corbin (1990) and is referred to as '*axial coding*'. The combination and comparison of the themes identified form the big picture (Hoepfl, 1997). The final stage, or translation stage, of qualitative data analysis involves the conversion of the conceptual model into a story line. Strauss and Corbin (1990:57) state that it should “closely approximate the reality it represents” and is referred to as '*selective coding*'.

#### **4. THE INFINITY APPROACH**

The on-going cyclic process of interpretive research to reach a point of saturation may be seen as an infinite process. The researcher may not reach a point of understanding until all possible gaps have been filled and with each new data set no new insight is gained. We represent this by using the well-known infinity ( $\infty$ ) symbol. Using the infinity symbol to guide the Grounded Theory process, the left hand loop is used to represent data gathering (DG) and the right hand loop is used to represent data analysis (DA). The crossing in the middle of the infinity symbol represents the reflection on the data and the understanding of the phenomenon and is called the critical crossing (CX). This is a critical part in the approach because evaluation takes place here and this is also the turning point for the researcher on whether (s)he will end the study or continue with another cycle.

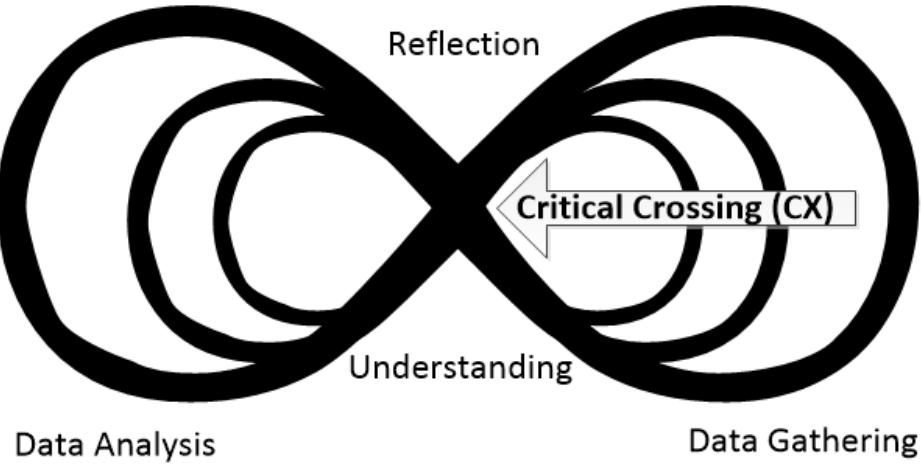
As mentioned in the previous section, data gathering includes the traditional techniques such as interviews, questionnaires, observations, and documents. Data analysis follow the Grounded Theory method and can make use of computer-assisted qualitative data analysis software (CAQDAS) such as

Hyper Research and Atlas.ti. Figure 1 illustrates the different dimensions – with its correspondent components – of the infinity approach.



**Figure 9: Infinity Approach explanation**

With each cycle of data gathering, analysis and reflection, a point of saturation is approached. If we use our infinity symbol ( $\infty$ ), we would represent the first cycle as a bigger symbol and with each new cycle the symbol becomes smaller, imploding on itself. The smaller cycle implies that data may be gathered from fewer new participants or the suspected factors have either been confirmed or rejected. Three cycles are shown in Figure 2, with two different representations shown in the depiction.



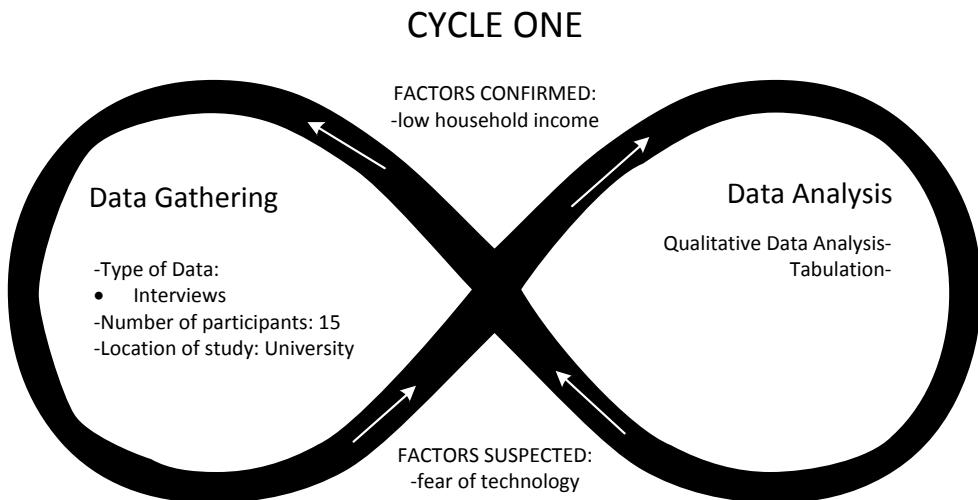
**Figure 10: An Infinity Approach representing three cycles**

In the Critical Crossing (CX) step of this approach the data analysed from the previous cycle is compared to the data gathered of the current cycle. When the data from the current cycle does not provide any new insight into the situation, it may be assumed that the study has reached saturation, and the researcher can conclude data gathering and its subsequent analysis. Should the data from the current cycle provide new insight into the situation, the researcher should then initiate a new cycle in the infinity approach. During the first cycle of the approach no comparison can be made so by default a first cycle and second cycle should always be implemented.

## 5. THE INFINITY APPROACH BY EXAMPLE

This section of the paper outlines a very simple hypothetical example using the infinity approach. Although the example is simple it may help students to understand the process. The scenario used is the investigation of the digital divide among first year students at a university. Using the standard

approach to research, the researcher formulates a research question such as: Which factors play a role in the digital divide among first year students? The researcher decides to interview first years using semi-structured interviews. Fifteen participants from a group of 100 first year students are selected to be interviewed. The interviews are conducted. After the interviews the recordings are transcribed and the researcher starts with qualitative data analysis. After the analysis the researcher found that *low household income* creates a digital divide among students. *Fear of technology* in their households emerges as another factor among three of the participants. Figure 3 represent this first research cycle in the infinity approach.



**Figure 3: Example of the first cycle of an interpretive study in the Infinity Approach**

During the first cycle some of the principles of interpretive research are shown:

**Principle 2:**

- To identify a theme such as *low household income* meaning should be attached to the data to contextualise it.

**Principle 3:**

- The interaction between the researcher and the participants by conducting interviews.
- The factor of low household income is confirmed from interviews and linked with existing literature.

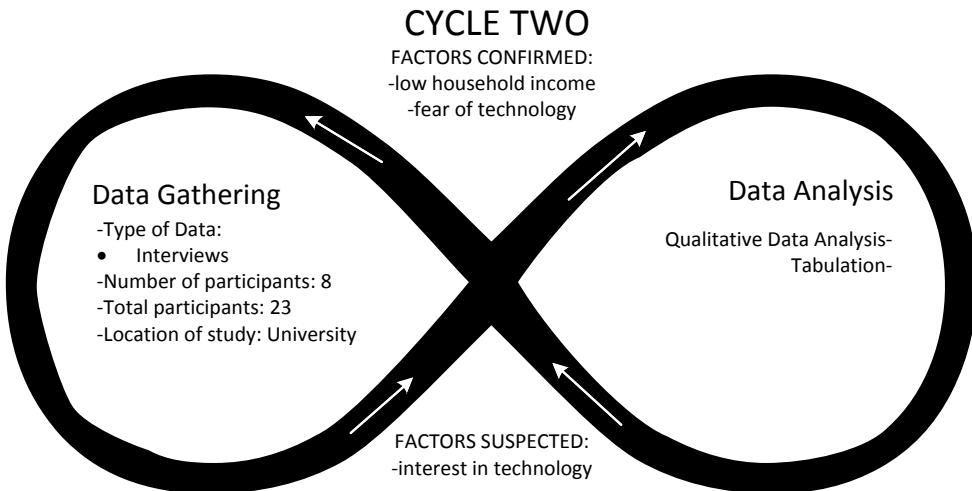
**Principle 4:**

- The factor of low household income was generalised from various interviews.

**Principle 7:**

- The suspected factor of *fear of technology* which leads to the next cycle.

The researcher suspects that the fear of technology is a valid factor to investigate and decide to conduct another set of interviews with 8 other participants of the group of 100 first year students forming the second cycle of the approach. Once again the data from the interview recordings are transcribed and qualitative data analysis is done. During the second cycle the *low income household* factor for the digital divide makes another appearance in the data and the suspected factor is confirmed, which is that they have a *fear of technology*. However, also during this cycle the *interest in technology* factor which was not apparent in the first cycle made an appearance with 3 of the 8 participants. Upon revisiting the data from the first cycle the researcher confirms the oversight on 2 of the 15 participants interviewed during the initial cycle. This confirms the researcher's suspicion that this could be a valid contribution towards the study and therefore a third cycle is implemented. Figure 4 represents this second research cycle in the infinity approach.



**Figure 4: Example of the second cycle of an interpretive study using the Infinity Approach**

During all the intermediate cycles most of the principles of interpretive research are shown:

**Principle 1:**

- Revisiting the data from the first set of interviews and comparing it with that of the second interview, necessitates the implementation of the hermeneutic circle.

**Principle 2:**

- To identify a new theme implies that meaning should be attached to the data to contextualize it.

**Principle 3:**

- The interaction between the researcher and the participants by conducting interviews.
- The confirmation of another factor.

**Principle 4:**

- The identification of a new factor must be generalised from various interviews.

**Principle 5:**

- The researcher should make sense of the fact that participants may contradict one another, to ensure that a story is told.

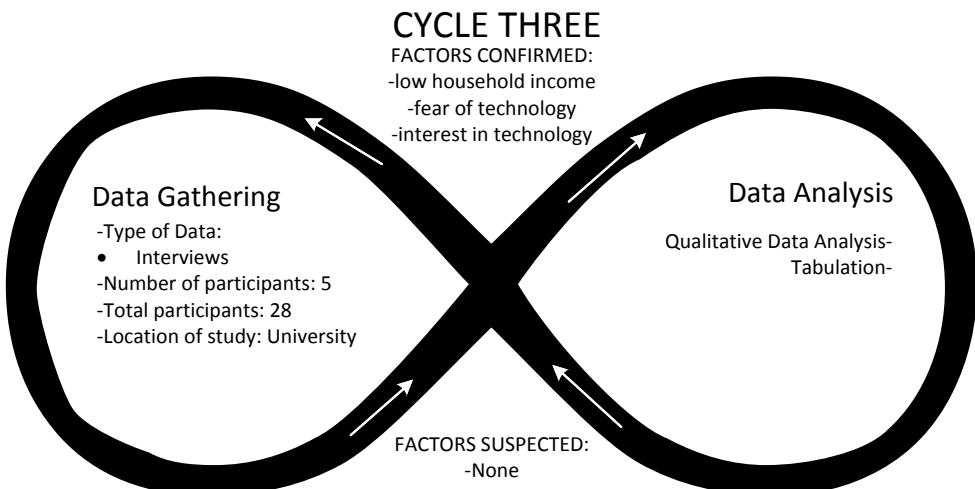
**Principle 6:**

- The researcher should make sense of multiple interpretations among participants.

**Principle 7:**

- A suspected factor leads to the next cycle.

The researcher suspects that the *interest in technology* is a potential factor to investigate and decides to conduct another set of interviews with 7 more participants of the group of 100 first year students forming the third cycle of the approach. Once again the data from the interview recordings are transcribed and qualitative data analysis is done. During this cycle the *interest in technology* factor for the digital divide makes another appearance in the data of 4 of the 7 participants and the suspected factor is confirmed. No new other factors made an appearance with the third cycle and 3 factors were confirmed. The researcher may safely assume that these three factors are key to the digital divide found among first year students. Figure 5 represents the third and final research cycle in the infinity approach for this study.



**Figure 5: Example of the third cycle of an interpretive study in the Infinity Approach**

During the last cycle one principle of interpretive research is prominent – in addition to the ones listed for the intermediate cycles:

**Principle 2:**

- To consolidate all the identified themes implies that data needs to be contextualized.

It should be made clear that it may be necessary to use more than three cycles; the number of cycles will depend on the researcher, the research and the participants. In this example three cycles illustrates the process sufficiently. The factors which are confirmed are now discussed, reviewed and compared to literature for theoretical and general concepts that describe the nature of human understanding and social interaction. This answers the research question: Which factors play a role in the digital divide among first year students?

The generalization provides an emergent theory for future research. The factors and generated theory is placed into context of the study to support contextualization setting the origin of the study, its limitations and future research. Students should describe what happened and they may use creative ways to support their narratives with textual or visual representations. Looking at each factor alone and also as a whole provide a better understanding of the situation, which is the goal of interpretive research.

## 6. CONCLUSION

Interpretive research attempts to understand a particular situation by conducting a series of repetitive steps. These steps are grounded in the hermeneutic circle; however this series of steps is not always clear and understandable to students, especially those who initially hold a positivist view.

The infinity approach is suggested and explained in this paper by means of a hypothetical example to provide a departure point for post-graduate honours students when they are doing an interpretive research study. The infinity approach may guide such students through the steps of conducting interpretive research. The suggested approach emphasizes the seven validation principles compiled by Klein and Myers (1999). It may help students to ensure the validation and increase the trustworthiness of their research by reflecting on the principles within each cycle of their study.

The infinity approach is currently used by a small number of post-graduate honours students at the NWU-VTC to guide them in their interpretive research journey. In future the feedback from these students on the experience with their interpretive research projects and whether this approached



assisted them in their study, would be used by the researchers to reflect on the approach for the purpose of evaluating and refining it.

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