The design of a Virtual Community of Practice to facilitate communication, information and knowledge sharing amongst art educators in Botswana Junior Secondary Schools.

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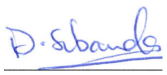
Declaration

Submitted in partial fulfilment of the requirements of the degree of Master of Arts, in the Graduate Programme in Digital Media within the School of Literary Studies, Media and Creative Arts, University of KwaZulu-Natal, South Africa.

I declare that this dissertation is my own unaided work. All citations, references and borrowed ideas have been duly acknowledged. I confirm that an external editor was not used. It is being submitted for the degree of MA (Digital Media) in the Faculty of Humanities, Development and Social Science, University of KwaZulu-Natal, South Africa. None of the present work has been submitted previously for any degree or examination in any other University.



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- Finally, special thanks to my late parents especially my mother, who passed away while I was doing this course. I dedicate this research to her.

Abstract

Newly qualified educators in Botswana face many challenges not least of which occurs when they are posted to rural schools a distance from other teachers and information resources. The Government of Botswana has committed itself to enhancing the ICT infrastructure for use in both the economic and educational endeavours of the country. Research conducted in first world countries show that Communities of Practice can take place in a virtual environment and that these can facilitate knowledge sharing and management. This research was conducted to investigate if a Virtual Community of Practice (VCoP), guided by the educational theories of Constructivism and Connectivism, could facilitate information and knowledge sharing among art teachers in dispersed location in the Botswana context.

Using Reeves and Hedberg's (2003) Development Research model, 13 art teachers, who were located in different parts of the country, participated in knowledge sharing through a Virtual Community of Practice. This study analysed the specific needs of art educators, interrogated the literature for best practices, formed a VCoP, and analysed how participants used it and reports on their comments

The research findings indicate that educators would be enthusiastic about the use of such a facility if there was a perceivable benefit especially in breaking down the geographical induced communication barriers that they face at the moment. The research does not propose the replacement of existing face-to-face workshops, meetings and other communication fora, but rather suggests a VCoP can complement them by allowing discussions to continue beyond such meetings. It is contended that a carefully structured and supported VCoP can improve information and knowledge sharing significantly among educators and other stakeholders in Botswana.

List of Acronyms

BTA	Botswana Telecommunication Authority
BTC	Botswana Telecommunication Corporation
CMC	Computer Mediated Communication
CMC	Computer Mediated Communication.
CoP	Community of Practice
ICT	Information and Communication Technology
iEARN	International Education and Resource Network
ISPs	Internet Service Provider(s)
Kbps	Kilobytes per second
NGO	Non governmental organisation
SDH	Synchronous digital hierarchy
VCoP	Virtual Community of Practice
VSAT	Very Small Aperture Terminal Satellites
ZPD	Zone of Proximal Development

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Chapter 1: Introduction

1.1 Introduction

As a Botswana citizen I was particularly interested in researching a topic that would inform educational and learning development in my country. I teach art education in a College of Education and have been involved with the development and implementation of the National Art Curriculum for both Junior and Senior Secondary Schools with the Ministry of Education in Botswana. After exposure to online learning at the University of KwaZulu-Natal I was of the opinion that a Virtual Community of Practice (VCoP) could support our newly qualified and less experienced teachers who are posted to geographically isolated schools as well as foster collaborative knowledge sharing amongst themselves and the more experienced educators. The findings of this research should assist in the improvement of current support systems for knowledge development and sharing among art teachers in Botswana.

1.2 Botswana background

Botswana is a sparsely populated country with a population of approximately 1.7 million citizens (Botswana Government Central Statistics Office, 2005). Its population is largely concentrated in the eastern part of the country, but schools are distributed across the entire country. In the five regions there are 206 Junior Secondary School some of which are in remote and relatively inaccessible areas. Almost all these schools offer Visual Arts as a subject choice (Botswana Ministry of Education, 2007).

The country, like other developing countries, has responded to global changes by coming up with a National Vision Statement that the Botswana government has called "Vision 2016". One of the key elements in this statement is the intention to transform the country through the use of information and communication technology in order to adjust to socio-economic and political changes as well as to respond to globalisation issues. Within this broad vision the Botswana Government intends creating "an educated, informed nation", where "[a]ll schools will have access to computers and to computer-based communications such as the internet" (Botswana Government Presidential Task Group, 1997, p.5). The aims and objectives of the vision are taken up by the Botswana National ICT Policy report (Botswana Ministry of Education, 2005, p.13) in particular the Ministry states that it intends to ensure:

- a culture of lifelong learning that maximises the potential within all citizens and accelerates innovation to develop a knowledge based system,

- access to relevant, localised and understandable information for all citizens, and
- an ICT access point in every village.

Since the drafting of Vision 2016, the government of Botswana has displayed its commitment by building fully furnished computer laboratories in all junior secondary schools. Through the support of some NGOs it has started pilot projects such as Internet Learning Trust, World Link, Thutonet, International Education and Resource Network (iEARN). These are designed to facilitate teaching and learning in schools (iEARN, 2005), and are recognised as promising developments in education although they are still at an infant stage.

Despite these initiatives, teachers' support and knowledge sharing is still conducted through face-to-face workshops and seminars. As a result art teachers, who are scattered across the sparsely populated country, travel long distances and are provided with accommodation which is expensive and time consuming. This research does not deny or minimize the importance of employing face-to-face communication and does not suggest its replacement, rather it has investigated other options that can supplement existing workshops and further enhance knowledge and resource sharing among art teachers in junior secondary schools, particularly for newly qualified, inexperienced teachers in remote areas of Botswana.

Taking into consideration the Vision 2016 statement and the Education department's commitment to the use if ICTs in schools, this research made use of the technology to create a VCoP and investigate its use among some of the targeted teaching staff members. The outcomes can be used by Botswana educators and other stakeholders to enhance their understanding of how online CoPs can be used in knowledge and resource sharing in their own educational institutions.

1.3 The importance of the study

The research is important as it introduces Botswana art teachers to some elements of a VCoP, a system that facilitates knowledge and resource sharing and shows how it can be used to supplement efforts initiated during workshops and seminars. Unlike the current practice, once the VCoP is up and running, teachers can have a sustainable platform which provides a timeless and distance-less tool in which teachers can collaboratively address their "work problems". Some of the benefits of VCoPs as outlined by Sharratt and Usoro (2003, p.3) are that

- the shared experiences are archived,
- the discussions are accessible to the whole community and other members,
- they promote diverse responses, and

- they solve practical problems through collaboration.

1.4 The research questions

The focal question of this research is formulated as "How can a VCoP be designed to facilitate communication, information and knowledge sharing amongst art educators in Botswana junior Secondary Schools"?

The following sub-questions were investigated to answer the focal question

- What methods of communication, knowledge sharing and communication are currently used by art educators in Botswana?
- What is the efficacy of these methods?
- Which technologies could be used for communication in a Virtual Community of Practice (VCoP) and what, if any, are their preferences?
- What are the problems that limit/hinder the use of ICT in sharing of knowledge and resources among art teachers in Botswana schools?
- Given the geographical isolation of Botswana Schools, is a VCoP practical for addressing local needs?
- How can a VCoP enhance the current traditional methods of knowledge and resource sharing among teachers?
- What are the key factors necessary for sustaining a VCoP?

1.5 Broader issues influencing this investigation

This research draws a distinction between information and knowledge but acknowledge their close relationship. Information is data in a given context, whereas knowledge according to Alexander, Schallert and Hare (1991, p.317) is "an individual's stock of information, skills, experience, beliefs and memories". One needs tacit knowledge to interpret information in order to create new knowledge. Therefore, this research assumes that tacit knowledge can only be stored in human mind (Bereven, 2002). The circulations and sharing of information among people in a given establishment enhances development of new knowledge and personal development which in turn benefit the establishment (Bereven, 2002).

New knowledge develops in conversation with others and practises in authentic environments. This is now possible with online communications tools where VCoPs provide a flexible strategy enabling workers to share work experiences among its members. VCoPs informally bring together people who have a "common ground" and allow them to implement

new ideas and knowledge in their current work environment. The community involvement establishes trust, mutual respect and reciprocal relationship among its members which is conducive for knowledge development and sharing (Sharratt & Usoro, 2003).

The research is grounded in Vygotsky's Social Constructivist approach in which individuals learn through social interactions and construct knowledge as a group (Doolittle, 1999). This approach is characterised by collaborative learning and real life situations (authentic tasks). In addition, it also exploits knowledge wealth from mentors in a given group. The development of a voluntary VCoP among art teachers in Botswana Junior Secondary Schools will facilitate an investigation into the ability of such a VCoP to facilitate knowledge development and sharing among art teachers in Botswana's geographical distributed schools.

The findings reported here can be used to benefit inexperienced, newly trained, teachers and can be applied in any related teaching discipline. It is also hoped that this research will contribute to the development of general body of knowledge on the use of VCoPs in knowledge development and sharing in Botswana in particular.

1.6 Limitations of the study

The study takes place at a specific time in the initial stages of Botswana's ICT infrastructure development and among a select group of volunteers. Expanding the VCoP to other educators on a broader scale, and possibly with Ministerial involvement could change the group dynamics in unexpected ways. As ICT infrastructure is rolled out and loses its novelty the enthusiasm of participants may also change. Ongoing research will be required to better understand the use of these technologies over a longer period of time.

Furthermore, this research can simply point to best practices and principals. While it follows Reeves and Hedberg's (2003) development research model it does not attempt to formulate a theory of VCoP use in Botswana.

Chapter 2: Framework of the research

2.1 Introduction

Broad brush strokes were used to paint the background of this research in Chapter 1. In this chapter finer details are added to explain the research framework including the research paradigm that informs the study and the methodology used in the research process. This is placed prior to the literature review, contrary to the usual order of a dissertation such as this, as the literature review is a fundamental part of the research, as apposed to a process that informs the research. Thus the paradigm and processes used are discussed prior to reporting on the research process.

2.2 Research Goals

Reeves and Hedberg (2003) classify research into two categories Basic and Applied (Development) research, grouped in accordance with the stated research goals. Basic research, according to Reeves and Hedberg (2003), is concerned with understanding of phenomena in a given field. They state that this type of research has been criticised for not having direct and practical application to education technology and is rather associated with academic presentations and publications which are not accessed by many practitioners.

This research falls within the applied research category, specifically development research as it is geared towards solving a practical problem with the use of educational technology. According to Seeto and Herrington (2006) development research of this nature, takes place when a researcher (Learning Designer) engages specialists and practitioners in analysing an educational problem and providing a practical solution to it (Seeto & Herrington, 2006) usually with the aid of educational technology. It should be undertaken to provide "design principles" that inform and "guide future" development in the use and development of educational technology (Reeves & Hedberg, 2003).

2.3 The research paradigm

The term 'paradigm', when used in relation research and evaluation, "refers to the explicit and tacit assumptions that guide inquiry within a field" (Walberg & Haertel, cited by Reeves & Hedberg, 2003, p.29). It is not clear if one's research goals influence the selection of a

paradigm, or one's belief in a certain paradigm influences the way in which a researcher chooses research goals. However, in this research the goals are clear and practically stated and therefore a paradigm is outlined to fit with these goals. Reeves and Hedberg (2003) outline four broad paradigms of inquiry into educational technology as described below.

2.3.1 Analytic-Empirical-Positivist-Quantitative Paradigm.

According to Reeves and Hedberg (2003) in this paradigm 'analytic' refers to the ability to define causal relationships between elements of the study, 'empirical' relates to the desire to define, predict and control these relationships of phenomena in order to ensure replication and verification of finding, 'positivist' "represents a faith in scientific progress and the perfectibility of humanity" (ibid, p.30) and 'quantitative' refers to the measurement of and analysis of variables.

Usually proponents of this paradigm will make use of controlled experiments in order to measure differences between variables, and attempt to maintain an 'objective' distance from the study in order to make deductions about the cause and effect of these perceived differences (ibid). Much early research into Computer Based Education was done using this type of paradigm leading to bitter debates on the issues of "no significant difference" and the Hawthorne effect (Reeves, 2005).

This paradigm is not applicable to this research as there is no attempt to compare online and face-to-face communities of practice, there are too few participants to make quantitative analysis viable and the emphasis is more on rich descriptions of activities and perceptions than quantifiable interactions.

2.3.2 Constructivist-Hermeneutic-Interpertivist-Qualitative Paradigm.

This paradigm, from Reeves and Hedberg (2003), places emphasis on the view that 'reality' is constructed by individuals and groups of people within a specific context. The hermeneutic aspect looks at values and constructs that underpin the area of study. An interpertivist element to this paradigm encourages the research to contextualise the analysis and present the different view points of various stakeholders. The qualitative portion places value in the human elements and rejects the numeric codification and mathematical modelling of research into educational interventions (Reeves & Hedberg, 2003).

This paradigm allows for the possibility of different view points within a specific context and the research reported here is closely related to this paradigm in that it interprets experiences primarily from Art Educators in Botswana but also seeks the point of view of Educational Officers, as well as drawing on reports from other practitioners engaged in communities of practice. The data gathered is purely qualitative and looks at issues related to culture, gender, geographical location, computer literacy as applicable to the use of a VCoP.

2.3.3 Critical Theory-Neomarxist-Postmodern-Praxis Paradigm

Here, Reeves and Hedberg (2003) identify research that uses critical theory to highlight the power relationships which control the systems under review for the benefit of one group over those of another, exposing any hidden agendas within any reform. It questions the concept of the use of technology leading to inevitable progress and looks for the differences between stated policy and actuality of practice.

While recognising that this type of critical analysis could make a very interesting study in Botswana, particularly in the study of the power relations of education and knowledge sharing among various role players, it is not the intention of this research to focus on any of these elements.

2.3.4 Eclectic-Mixed Methods-Pragmatic Paradigm

This is the method recommended by Reeves and Hedberg (2003) as the most practical paradigm. They (ibid, p.35) state that the 'eclectic' indicates a "willingness" to use methods of data collection and problem solving from the other paradigms, the "mixed" recognises "that multiple perspectives are necessary to 'triangulate' or 'bracket' information". The "pragmatic" portion of the title represents the practical aspect and though it recognises that although "ultimate prediction and control may never be achieved … things can get better". Most importantly this paradigm concerns itself with "practical problems that confront … educators and trainers" (ibid, p.35).

This research follows the Eclectic-mixed-methods-pragmatic paradigm in conjunction with the Constructivist-hermeneutic- interpertivist-qualitative paradigm. It recognises the need for qualitative research to give depth to understanding and meaning of the human experiences, and at the same time recognises and emphasises the contextual nature of the findings reported here. The research is conducted with a view to solving an immediate practical

problem with an intention to offer solutions within a very specific setting that may not be generalizable for all such circumstances.

2.4 Research Methodology

Methodology is a broad concept which encompasses selection of complementing methods, their importance, why and how they are used in a research. It focuses on "process", "tools" and "procedures" that are suitable for a researcher to use in order to address the research questions (Henning, Van Rensburg & Smit, 2004)

Recognising the lived experience of participants as a valid representation of their reality was considered an important aspect of this research and as such it was necessary to record these in line with findings reported in the literature and correlate them with reported "best practices". The research methodologies applied here have been adapted and borrowed from a number of different models using an 'eclectic' and 'pragmatic' approach to meet the research goals.

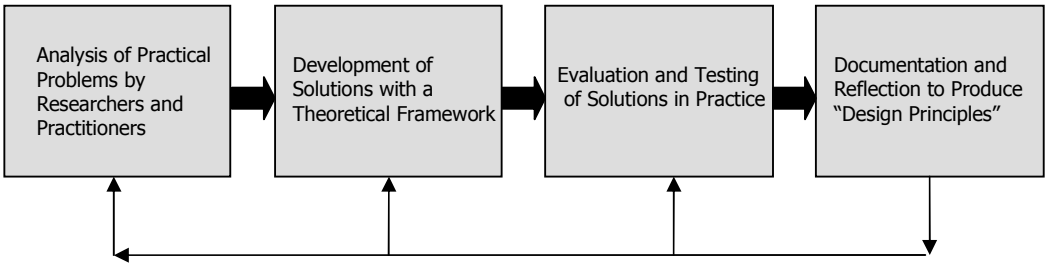
2.4.1 Development research

The "development research" as described in 2.2 above fits well within a pragmatic, constructivist, qualitative paradigm. Reeves and Hedberg (2003, p.278) state

> Development research … requires a pragmatic epistemology that regards learning theory as being collaboratively shaped by researchers and practitioners. The overall goal of development research is to solve real problems while at the same time constructing design principles that can inform future decisions.

This research also fits with the type of research in which a researcher engages subject specialists, practitioners in analysing an educational problem and providing a practical solution with the aid of technology (Seeto & Herrington, 2006). This process involves the following steps; Analysis, Development, Evaluation and Documentation as illustrated in Figure 2.1 below

Figure 2.1: Development Research



(Redrawn from Reeves & Hedberg, 2003, p.274)

Development research was chosen as the broader method because it allows the researcher to interact with the practitioners in identifying problems and negotiating practical solutions to a given problem in a real life context (Reeves & Hedberg, 2003). Unlike Empirical Research where theory is detached from practice, Development Research evolves from collaborations between researchers and practitioners. While Reeves (2005) argues that theory should be used to form principles that will guide educational decisions in the future this research uses theoretical perspectives and best practices identified in the literature review. It makes no attempt to formulate a theory of its own.

2.4.2 Single case-study as a methodology

Within the framework of development research, single case-study methodology was also applied in this research. Gerring (2007, p.65) argues that a case study "is best defined as an intensive study of a single case … with an aim to generalise across a larger set of cases of the same general type" while Yin (2003, p.13) states that a "case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident". This definition is similar to Gillham's (2004, p.1) where he states that a case study is:

- A unit of human activity embedded in the real world;
- which can only be studied or understood in context;
- which exists in the here and now;
- that merges in with its context so the precise boundaries are difficult to draw.

In terms of these definitions, the study of users and their interaction within the developed VCoP can be viewed as a case study as it is clearly a study of human activity in a given authentic environment. The purpose of the study was to understand the activity in a specific

current context, namely that of communication, knowledge sharing and creation in a very specific location at a given time in the development of ICT usage in Botswana. The boundaries between the activity and the context in which they occur are difficult to define, for example does the geographical isolation of some participants influence the interaction and if so, is it as a contributor or inhibitor? There is, however, no attempt to "generalise across a larger set of cases" as suggested by Gerring (2007, p.65), but rather to draw on knowledge developed elsewhere and contextualise this knowledge with the findings of this research.

The advantages of a case study are that it employs several different techniques to gather information from the case. These techniques complement each other to provide validated evidence. In addition it is naturalistic and allows researchers to explore evidence openly and create new links with existing literature for better understanding of a situation (Gillham, 2004).

2.4.3 The convergence of development model and case-study methodology

This research project it was advised predominantly by the development model in that, first the practical problems faced by newly qualified art educators was interrogated. This was followed by a literature review to understand possible interventions as reported in other similar research and the theoretical underpinnings of such interventions. A VCoP was developed and the use of it interrogated with a final interview of all participants to more fully understand their experiences of the intervention. However in executing this model various methodologies and tools were also borrowed from case-study research.

2.5 Research tools

The collection of data followed Yin's advice to use multiple sources of evidence in order to document the "convergence of evidence" (Yin, 2003, p.100). The tools used in this study are discussed below.

2.5.1 Interviews

Where possible, one-to-one interviews were conducted in a face-to-face environment with participants. When this was not feasible due to distance and time constraints, the interview questions were emailed to the individual participants and where it was necessary to gain clarity follow-up questions were conducted via email and cell phone. Semi-structured interviews were used as they allowed me to gather an in-depth understanding of phenomena by probing for further explanations (Hancock, 2002).

The initial interviews (Appendix A) were meant to be conducted prior to involvement in the VCoP but due to distance and poor internet connectivity, some were conducted after participants were exposed to the VCoP, thus, these one-to-one interviews were conducted both electronically and face-to-face. They were designed to evaluate the state of the current system of information and knowledge sharing among art teachers in Junior Secondary Schools in Botswana. It looked at the processes, challenges, problems and possible solutions to their situation. In addition the responses gave demographic details of the participants.

The concluding interviews (Appendix B) were conducted after participants had used the VCoP. These were conducted in order to evaluate whether the VCoP had facilitated information and knowledge sharing among participating art teachers. It also looked at the processes, advantages and disadvantages of VCoP, covering local issues, questioning how a VCoP could supplement the current system as well as exploring participants' personal feelings for such a system.

The interview for regional officers (Appendix C) was designed to provide an administrative view of the current systems of information and knowledge sharing. It was also intended to investigate their perceptions, experiences and their role in the process. Though they did not take part in the VCoP the interview was meant to facilitate triangulation of data sources as well as to inform the study of any official issues that other participants may not know. It was, however, difficult to get officers to participate. Firstly, they were away visiting regional sites and rural schools so the interview had to be conducted via email. Secondly, the ministerial art department does not have a full complement of officers with a background in art; these officers were unwilling to participate. This was unfortunate as it is exactly this kind of issue that a VCoP could be used to address. Only one regional officer answered the questions in the interview schedule.

2.5.2 Participant observation

Participant observation can be defined as a qualitative method in which a researcher investigates the subject(s) by being actively involved in their day to day activities (Grix, 2004). Here I designed the VCoP intervention and observed the interactions of the community, as well as, managed the activities collaboratively with participants.

Participant observation, unlike interviews, is direct in the sense that the researcher records the behaviour of participants as it unveils in its natural environment. The other strength of this method is that it can be, and was, used it in conjunction with field notes (log book) for

record keeping purposes following Gillham's (2004) advise to use these activities and tools to record observed behaviour as they happen and to help plan future activities.

This participant observation was conducted mainly to observe and gain insight into how members of the community developed and shared knowledge among each other, but also to facilitate the development of the VCoP when necessary. Bracketing was used to identify when the researcher's bias or influence may have swayed other participants' responses.

2.5.3 Artefacts

Artefacts that were drawn into the analysis included usage patterns of the developed system, SMS messages and email correspondence. Records of the use of these artefacts offered an insight into the different roles played by different modes of communication.

2.6 Data analysis

The nature of the study and the number of participants did not allow for quantitative data analysis, but further to this, it is contended that in a larger study numeric analysis would give only limited knowledge of the system. To understand the dynamics fully it would need to include extensive qualitative data gathering and analysis. All data collected was in the form of qualitative data allowing the collection of a rich experiential dataset.

All data collected from tools described above were imported into QSR Nvivo™ and analysed according to the research questions and themes identified in the literature review. Anomalies and unexpected results were also highlighted.

2.7 Trustworthiness of the research findings

This study is based on a qualitative research paradigm which requires specific attention to be focused on issues of generalisation, validity and researcher bias. These issues are discussed more fully below.

2.7.1 Purposive sampling

According to the Commonwealth Educational Media Centre for Asia (nd, Chapter 13) "[p]urposive sampling is best used with small numbers of individuals/groups which may well

be sufficient for understanding human perceptions, problems, needs, behaviors and contexts, which are the main justification for a qualitative audience research". In this case criterion sampling was used in selecting people to participate as it was considered important to ensure that the community be made up of both genders, as well as local and expatriate teachers. These participants had to be located in different parts of the country including cities, big villages and small villages. Some of these areas had to represent areas that are far from other communities. In addition communication infrastructure in Botswana varies from one location to another so these were also factored into the selection process. Finally, it was considered useful to have participants with different teaching experiences in order to allow for the exploration of the concept of the "Zone of Proximal Development" (Vygotsky, 1978) among participants.

It was also necessary to keep the number of participants to a small manageable group of approximately 10 people which could be enlarged at a later stage if the intervention proved successful. I thus, initially, approached 24 teachers realising that some would not accept the invitation and others were likely to "drop out". Some teachers were invited through face-to-face meetings but most of them were approached through the use of cell phone, land line telephone communication and later emails.

Although the sample size is not large enough to form a generalized principle it has firstly been manageable in terms of online communication and secondly it was considered sufficiently representative to offer enough insights to issues particularly relevant to local needs.

2.7.2 Generalisation

In particular the concept of generalisation is a concern raised by opponents of case study methodology, particularly singular case studies. Domeyer (2000, p.52) states that in "fields in which there is a concern with individuals, not just aggregates … all research findings are tentative". That is certainly the case in this study. The research reported here, has taken a single instance and extrapolated recommendations from both the literature reviewed and the intervention itself. It makes no claims to the replication of this study in other instances where variables and other influences may radically alter the dynamics of the intervention. It however recommends a course of action that could, with continuing research and development, work in the specific context.

2.7.3 Validity

This, of course, brings into question the issue of validity which, within case study and development research, is also a contentious issue. Validity, in the experimental tradition, "emphasizes replicability of results" (Schofield, 2000, p.71) but more generally it is concerned with the accuracy of the findings. Schofield (ibid) goes on to claim that

> "the goal is not to produce a standardized set of results that any other careful research in the same situation or studying the same issue would have produced. Rather it is to produce a coherent and illuminating description of and perspective on a situation that is based on and consistent with detailed study of that situation".

Validity of such research can be enhanced by the use of multiple sources of information and data. Yin (2003, p.85) highlights six sources while taking care to state that a complete list may be far more extensive. The six he chooses to highlight include documents, archival records, interviews, direct observation, participant-observation and physical artefacts. The research here uses four of these namely:

- Documents – specifically government and education ministry documents related to the use of ICTs in education.
- Interviews – with participants, where possible people who were unable to participate, and an Education Officer.
- Participant observation – where I took the role of facilitator and "champion" of the system, not only participating in the interactions but sometimes directing the interactions as well.
- Physical artefacts – where these are the recordings of interactions within the VCoP.

2.7.4 The question of bias

Lubbe (2003, np) reflects the thoughts of many researchers when he claims that "it is naive to assert that any form of research, or perhaps human activity generally, is without bias". He goes on to state that "bias cannot be totally eliminated but should be recognised and its implications acknowledged and accepted (i.e. lived with)". This is also articulated by van Niekerk (2002, p.33) in his plea to abstain from "killing the messenger", he states

> "The one contribution that qualitative research has made is to re-affirm the researcher as subject in research. The researcher or writer is not an anonymous persona without a history or bias who denies his/her own existence by producing cautious, sterile and often paralysing so-called 'balanced texts' parading as the culmination of so-called 'scientific thinking'. Distancing oneself from the text could be the consequence of a refusal or inability to become involved in their research".

This is particularly true within a study where the researcher is a "participant observer" as not only can the researcher be selective on the data presented, or documents reviewed, the researcher can also direct the behaviour of participants and as such influence the outcomes. It is important to acknowledge from the outset that this is likely in the case reported here. In the literature review comments related to the role of the facilitator or 'champion' of such an intervention are reported from other research, and it is contended that without such a 'champion' or motivator this case study would not have been possible. Thus bias and personal influence is acknowledged and should be factored into the questions related to validity and any further research.

2.8 Ethical considerations

Both UKZN and Botswana ethical standards were met. The research division at the Ministry of Education in Botswana was approached for permission to conduct this study, as required by Botswana legislation (Appendix D). In addition executive permission was granted from the Post Graduate Human Sciences faculty for the research to proceed (Appendix E).

Participants took part on a voluntary basis and their personal details and sensitive material was handled with confidentiality. The research findings will be shared with the participants and used to improve knowledge development and resource sharing among art teachers and other stakeholders in art education.

2.9 Conclusion

The first two chapters have outlined the background and research framework used in this study. The subsequent chapters follow Reeves and Hedberg's (2003) development research methodology, outlining the sequence of events and findings as follows:

- Analysis of the practical problem by researchers and practitioners – Chapter 3.
- Development of solutions within a theoretical framework – Chapter 4.
- Evaluation and testing of solutions in practice – Chapter 5.
- Documentation and reflection to produce "design principles" – whole dissertation and Chapter 6

Chapter 3: Analysis of the practical problem

3.1 Introduction

In order to fully investigate a potential solution to a problem it is necessary to understand the nature of the problem before undertaking a literature review and the development of a solution. This often causes confusion in a dissertation of this nature as it appears as if the results are being discussed prior to the research being undertaken. The initial inquiry is reported in this chapter is so far as it seeks to report on the current practical problems faced by new and experienced art educators in Botswana, specifically in relation to collaboration and sharing of knowledge. It specifically answers the two initial research questions, namely:

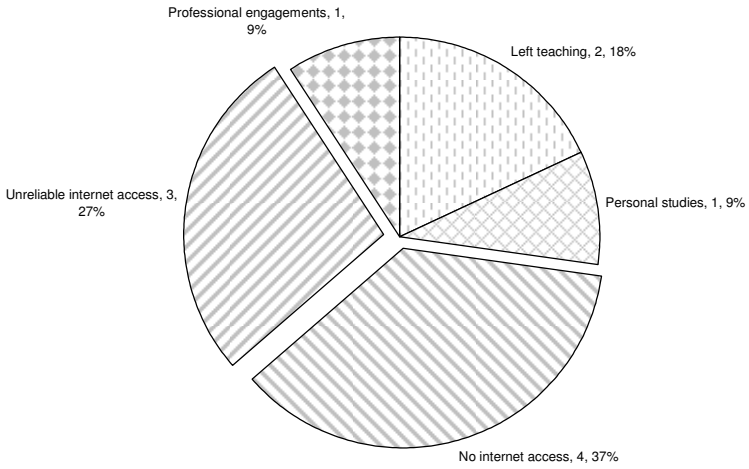
- What methods of communication, knowledge sharing and communication are currently used by art educators in Botswana?
- What is the efficacy of these methods?

Chapter 1 outlined my perceptions of the problems facing educators in Botswana and Chapter 2 covers the research framework applicable to this study. This Chapter begins with the demographics of participants, and as far as possible the reasons given for non-participation as these are all concerned with identifying and outlining the practical problems. The chapter then discusses the outcomes of the initial questions posed in order to find out the participants' perspectives of the problems they face in collaboration and information sharing.

3.2 Non-participation

Of the initial 24 people approached to participate, 17 managed to login into the VCoP but only 13 of them participated successfully. As reasons for non-participation can be as informative as data from participation, I approached those that did not engage the system. Of the 7 who never logged in 2 had left teaching, 1 was too busy with part-time courses and 4 did not have internet access. There were 4 who managed to login but did not participate any further. The reasons given by the participants were; unreliable internet access (3), and other pressing professional engagements (1). As can be seen from the pie chart (Figure 3.1) below not only basic internet connectivity but reliable connectivity can be a key motivating factor. However, it is interesting to note that later on it became evident that other people with 'problematic access' were still able to participate and expressed enthusiasm about the potential of using technology in this way.

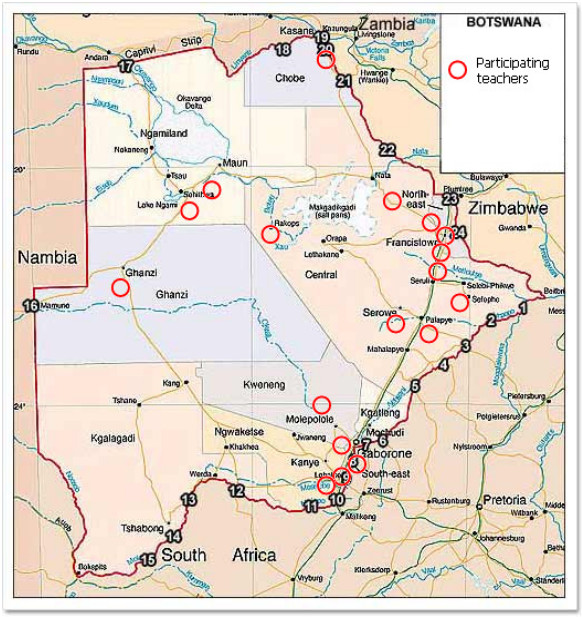
Figure 3.1: Reasons given for non-participation



3.3 Demographics of remaining participants:

The 13 remaining participants were representative of the criteria outlined above. Six were experienced teachers and 7 had less than 6 years teaching experience. There were 11 male and 2 female participants. Nine were Batswana teachers while 4 were expatriate teachers one each from the United Kingdom, Guyana, Kenya and India. They were drawn from disparate areas of Botswana as depicted in the map (Figure 3.2) below.

Figure 3.2: Location of participating teachers



(Adapted from Botswana tourism website http://www.botswanatourism.co.bw/maps/maps.html)

3.4 Understanding current practices – the initial interview

An initial interview (Appendix A) was conducted with these participants to better understand current practices, prior experiences and expectations. Every effort was made to conduct these interviews prior to the running of the VCoP but due to unreliable internet services and problems posed by geographical distance some interviews had to be conducted using the VCoP technology. Where possible individual face-to-face interviews were conducted (participants 2, 3, and9), recorded and subsequently transcribed. However, those participants who were in isolated areas (participants 1, 4, 5, 6, 7, 8, 10, 11, 12 and 13) answered the interview questions by filling in a Word document sent via e-mail and with follow-up questions posed in the chat room.

The responses were uploaded into QSR NVivo™ and coded according to the research questions, highlighting general themes and opinions. In particular this interview was used to uncover background information about participants' teaching experience, their experience with online tools, their location, policies relevant to information sharing and communication and how they share and develop information and knowledge among each other in the current systems. The results are discussed below in relation to the research questions.

3.5 What methods of communication and knowledge sharing are currently used by art educators in Botswana?

Participants indicated that they share information and knowledge mainly through formal face-to-face gatherings such as meetings, seminars, workshops and exhibitions. These are conducted at different levels; local school, cluster, region and national. The group sizes get larger as they move from local school to national level.

Informal meetings occur in small groups during scheduled meetings and workshops. This also occurs in neighbouring schools as they interact with each other in social settings. Informal meetings are rare and almost non existent in dispersed locations due to distance. According to Participant 2

> *"There is not much happening in networking or so forth. The only time we get to share this information is when we are in workshops"*

The regional officer states that meetings are generally formal

> *"..to discuss job and performance related issues"*

The schedule for gatherings in which teachers share information and knowledge is unpredictable depending on the demands of the planned activities in a given period. This also varies at different levels, for example, at school level meetings are more frequent and they become less frequent or do not take place at all at national level. On average departments have 2 meetings in a term accompanied with a lot of informal sessions within the school. At cluster and regional level meetings are organised at least once a term (3 months) but when they are preparing for an exhibition and related activities, meetings can be more frequent. At national level they meet at least once a year. Meetings are manageable at school level but become less frequent and difficult to manage as the group gets larger and the area more dispersed. Here the regional officer stated that meetings occur

> *"Once every 3 months in large group[s] and at least monthly school based"*

Stakeholders in collaboration with teachers plan meetings and workshops for teachers on the bases of professional needs. Some of the seminars and meetings are organised for plenary purposes and to discuss professional and administrative issues such as the art of teaching, curriculum, students' assessment but, according to participants, very little is covered in these areas. Meetings are also intended to address emerging issues and capacity building as stated by the regional officer who says the type of information and knowledge shared is

> *"[o]fficial information, self-development information, contemporary issues, emerging issues, and capacity building information".*

Workshops are mainly used to share various skills in various forms of art. Currently, the focus is sharing information and skills in new areas of the syllabus such as photography and computer graphics. Although workshops address a wide range of activities their scope is limited and does not adequately explore art education issues. Most gatherings are dominated by students' exhibitions and fairs. Participant 9 states that

> *"The other information is related to what's going on in the art teaching fraternity, but this is very limited. This is one area that we really need to improve because even when we go to meetings the kind of things we talk about mostly we don't have many things, we only talk, the agenda is mostly limited to exhibitions".*

These meetings are organised through the use of various forms of technology such as sms messages and facsimiles In geographical dispersed locations they have limited face-to-face gatherings and communicate mainly through letters, savingrams, telephones, cell phones and fax. The use of the internet is only starting because many schools have just had internet services installed.

3.6 Motivation for sharing

There are a number of factors that motivate teachers to share. Generally individuals participate if they feel that they will gain some benefit from the process either by imbibing or imparting skills. Participant 2 felt that those teachers that practice the subject outside of the classroom, discover new things and that motivates them to share their experiences with others. Some take part as they felt it "empowers" them and this boosts both their professional and personal development. Participant 9 states

> *"I would think that for personal growth and also for academic excellence … because when you go to a meeting and you gather information or knowledge that is going to help you improve the performance of your students … that is motivation…"*

Ideally, these activities enhance their performance in their practice. Some participants stated they share their knowledge to increase their chances for promotion at work and to learn new things.

Effective, efficient and easy sharing methods can also promote teachers participation in information and knowledge sharing. For example, according to participant 9, participation in meetings and workshops in their cluster improved after they abandoned short meetings which they initially held after classes and introduced whole day meetings in which they provided meals. This made the distance covered worthwhile, however it had a negative effect on teaching because schools were not able to use substitute teachers.

3.7 What is the efficacy of the current methods?

The current system of information and knowledge sharing has some challenges. However, it has enabled teachers to share substantial information and skills in their practice. It allows individuals to come face-to-face and demonstrate complex skills in which participants get "first hand information" and they get feed back immediately. Face-to-face meetings also enhance trust among participants. The current system is relatively manageable in co-located schools due to proximity. This also enables individuals in such locations to visit each other and share on a one-to-one basis. The current system is fairly helpful because it enables teachers to share both information and real work experiences. However, participant 9 strongly feels that when compared with the developed world it needs to be improved in order to have a greater impact in the practice.

3.7.1 Limitations of the Current System

Botswana's sparsely populated pattern poses a challenge in information and knowledge sharing among art teachers. Participants expressed concern of schools being far from each other. These long distances make it very difficult, if not close to impossible, for participants to share because they have to travel long distances in order to attend meetings and workshops. Participant 2 states that "*If you take for example teachers in bo Ncujane, you know, we don't meet them except may be during school vacations*".

The other challenge is that in remote areas the general trend is that there are poor services and resources as compared to urban areas. At times they do not attend such fora because of poor public transport and lack of funds for transport and accommodation. This problem is aggravated by poor services such as lack of electricity and unreliable postal services, phone and fax services. These shortcomings make it difficult for participants in such locations to share their work experiences with other teachers in other parts of the country. Participant 10 asserts that

> *"… in the Gantsi District, the schools are widely dispersed such that it becomes close to impossible at times to get information, on time and to the right receiver. The closest school is some 200 km away and if the fax machines that we rely on are not working, as is always the case, we are doomed".*

This is, however, refuted by the regional officer's statement where in his view

> *"… there are very minimal chances of one failing to receive information under normal circumstances".*

This contradiction indicates that there may be differences in the difficulties faced by teachers who are isolated from their peers and those that come from more urban areas. However, a common dilemma for teachers in both locales is to decide if it is better to focus on their daily duties and the school's agenda or to dedicate time to the welfare of the practice at a broader level. There is also weak collaboration between junior schools, senior schools and colleges. According to participant 8 there is also regional isolation characterised by poor sharing between regions.

Another major limitation raised by participants is that the meetings are conducted occasionally and over a short time period. As such they do not have the capacity to sustain continuous information and knowledge sharing. In addition, although there are visits made by regional officers in an effort to follow up developments in schools, these efforts are perceived by some participants as being inadequate. According to participant 2,

"… there is no monitoring after such workshops to see if each and every teacher is applying that into the classroom learning".

The other challenge of the current system of sharing is that meetings and workshops are restrictive and limiting in the sense that they can only accommodate a certain number of people at a given time. This denies a large number of teachers an opportunity to take part in the sharing process. Therefore, the outcomes of such gatherings are not a true reflection of teachers' contribution in a given area. Although there are challenges associated with meetings and workshops in disperse locations, they are relatively successful in co-located schools.

Competition amongst teachers also affects art teachers' willingness to share. Teachers compete with each other for various things such as progression, promotion, selection for further training and elevation for better jobs. When selecting teachers for a position their potential is measured by their performance at work and compared to that of other applicants. This has adversely affected sharing because the information and knowledge that they have is seen as a recipe for success and as a result sharing becomes a threat.

Another setback for the current system is that there is a general feeling that teachers are de-motivated by lack of recognition and incentives. These feelings are exacerbated by formal and bureaucratic structures with stringent policies that limit what can be achieved through informal settings. Some participants claimed that teachers do not present papers as, in their view, meetings and workshops do not provide a suitable environment for such. Those who are willing to write and present papers do not get support for the extra effort and work.

In addition, the current system does not provide alternative options such as the internet for sharing purposes. In areas where it is available it is evident that many teachers use computers for a wide range of things but very few use it for communication purposes. This is because most teachers lack the necessary skills to share with others online. Participant 12 asserts that

"Most of them they don't have access to the internet or they might be in a remote area or no knowledge in the advanced technology".

This is confirmed by the regional officer who stated that "*inadequate skills especially in IT*" was one of the factors that hinder teachers from sharing knowledge.

On a personal level, participants stated that some teachers do not share because they lack the capacity to do so and may be uncomfortable sharing in large group.

Almost all participants do not think that Batswana culture significantly affects information and knowledge sharing except for three participants. Some of the issues that they raised are that culturally elders are considered knowledgeable and it is disrespectful if a young person differs with them. According to Participant 11 this is seen in elderly teachers and those that hold high position who do not share in a reciprocal fashion. They tend to be conservative and resist new information and knowledge which negates the intentions of in-service training. Another related challenge occurs when teachers engage in arguments due to different perspectives and cultural backgrounds. Such unresolved differences if allowed to grow can affect meetings and workshops attendance and hence sharing is also affected.

3.7.2 Current strategies for improving communication and knowledge sharing

Participants have mixed feeling about what is done to improve the current system. Half of the participants (6) feel that the government is not doing enough to improve the current system of information and knowledge sharing. On the other hand some said that there are improvements such as increased number and better organisation of workshops, for example letters are sent well in time. Regional officers pay monitoring visits to school even though these are not frequent enough to create the desired impact. Despite these claims, teachers still raised concerns about delays in postal services, distance and poor turn up at these gatherings. There are efforts to address scarce skills and new topics in the syllabus. As a result workshops have focused on Computer Aided Design (CAD) and related technologies. However, these workshops do not deal with online communication nor information and knowledge sharing. Participant 11 adds that

> *"…centres around exhibitions, strategies on students performance and little is said on knowledge development of art teachers"*

Another big step taken by the Botswana government is the start of a program intended to install satellite internet in all schools across the country. Companies are currently installing these facilities and some schools have the internet service up and running. In addition all schools will be provided with ICT support staff. Despite these developments, the process is very slow and some of the projects that are reported as being complete have excessive down time. In addition, many teachers do not have the necessary skills for online communication hence they resort to face-to-face interactions.

3.7.3 Teachers' suggestions for improving current strategies

Teachers have a wide range of ideas on how the current system can be improved. Participant 2 defines art as a broad field with many disciplines and that teachers need to work collectively and share their experiences for the benefit of their students and of the practice of art as a whole. The same sentiment is shared by Participant 7 who adds that teachers need to collaboratively plan their activities and find alternative approaches of sharing. According to Participant 9, this collaboration must be grounded on a policy that will regulate such activities so that teachers will see sharing as part of their duty as opposed to extra work. To establish a successful system all the stakeholders such as the curriculum designers, examination officers, training personnel, museums and practicing artists should present papers that will facilitate sharing.

Participant 13 is of the view that teachers should take the initiative in leading their information and knowledge sharing activities. They should offer resources and assistance to each other at different levels. In return, Schools and the Ministry of Education should recognise teachers' efforts in the sharing process as this would motivate their participation. Teachers could form social networks among themselves and broaden the scope of workshops beyond exhibitions. They could also promote awareness of sharing and this should be extended to museums and practising artists. Teachers should be exposed to modern technologies and explore online and open communication as this technology is perceived to be effective, efficient and relatively cheap.

All participants agree that there is a lot that can be done to improve the current situation. Some of the participants raised issues related to the sending correspondents on time, regular meetings and workshops and the use of newsletters. Despite this 9 of them strongly feel that the internet and related technology should be explored to alleviate the current systems of information and knowledge sharing among art teachers.

3.7.4 Policies

The regional officer confirms that there are policies that regulate information and knowledge sharing among teachers, however, 12 participants stated they were unaware of this. For instance, participant 11 states that

> *"I haven't heard of any but if they exist they are not in use".*

While these policies on information and knowledge development and sharing are unclear, there are communication routes and channels for teachers which participant 9 finds restricting. For example, he states that teachers cannot use facilities such as telephones in the absence of an authorising officer and letters must receive official approval before being sent. It is encouraging that despite these challenges many educators still make an effort to share information and knowledge amongst each other.

3.8 What experience or knowledge do teachers have about VCoPs?

Prior to participating in this research, most teachers did not know much about Virtual Community of Practices. Five of them stated that they did not know anything at all. Three felt they had a vague understanding but confined their definitions to the use of technology. However it is important to note that, for the reasons stated above, these 3 respondents answered the questions after they were exposed to the VCoP and it is not clear if their answers were guided by their participation rather than prior knowledge. Only two had a broader understanding which encompassed a sense of common goal and interest among community members which is considered a core element of a VCoP.

3.8.1 Technologies currently used by art educators?

Although teachers have different experiences in the use of technology, almost all participants have used the internet and emails in their personal capacity. A few teachers had explored different applications such Microsoft Office, Photoshop and Corel Draw. They focused mainly on the use of graphics applications as it is a requirement of the new art curriculum. Only 4 teachers used online communication tools such as blogs and chats for social networking and one expatriate teacher used Skype™ for similar purposes. While all these teachers are exposed to Information and Communication Technology, none of the participants had used a Learning Management Systems such as OLS for teaching purposes.

3.9 Conclusion

Currently information and knowledge sharing is mainly conducted through face-to-face interactions. Although these facilitate sharing they have many limitations especially due to distance, expenses and teachers' workloads. As a result communication among teachers is poor. According to the participants these problem can be addressed by the use of technology to facilitate communication.

Chapter 4: Development of a solution with a theoretical framework

4.1 Introduction

Having identified the problems faced by art educators the next step, in terms of this research model, is to outline the theoretical framework that advises the development of a solution. This has been done in the form of a literature review that covers the theoretical premise of the solution as well as an analysis of published 'best practices'.

4.2 Educational theories

Learning is a complex process and there are a number of educational theories that attempt to explain how humans and animals learn. The three major theories are Behaviourism, Cognitivism and Constructivism. These theories have contributed to the development and understanding of human learning. The key difference is that each theory puts emphasis on different aspects (Mergel, 1998) of the learning process.

Education in Botswana is predominately traditional, employing a combination of behavioural and cognitive theories. This applies as much to teacher education and in-service training as it does in the classroom. In order to fully appreciate the difficulties in employing a constructivist more open methodology as applicable in a VCoP one needs to understand the tensions that arise from radically changing practices and the role that technology can take to bring about these changes.

4.2.1 Behaviourism

Some of the behaviourist scholars are John. B Watson, Ivan Pavlov, Edwin R Guthrie, Edwin L. Thorndike and B F Skinner (Kearsley, 2009). Behaviourists believe that studies should focus on observable behaviour and how it is shaped by the external environment. This sentiment was shared by Watson who negated the study of mental processes and advocated for the study of observable behaviour only (Woolfolk, 1998). Among these scholars there is a strong argument that the use of incentives (rewards) is a good practice because it is a tradition that has been in use across cultures (Learnativity, 2002).

Placing emphasis on the association of stimulus, response, punishment and rewards (Woolfolk, 1998), these school perceive knowledge as an objective truth that exists independently from the beholder. Therefore, learning is seen as a reflection of the learned objective truth (Funderstanding, 2008). A Behaviourist learning environment is characterised by emphasis on objectives and systematic instruction designed by the teacher to impart knowledge. Learning is evaluated in terms of how learners have achieved the performance objectives (Learnativity, 2002).

Behaviourism has contributed significantly to both conventional classrooms and computer based learning. These developments lead to the development of "Individual Prescribed Instruction (IPI)", "Program for Learning in Accordance with Needs (PLAN)", "Computer-Assisted Instruction (CAI)". Some web based learning environments have been influenced by behaviourism where such environments were used mainly for the transmission of information from instructors to learners with minimal interactivity. These were mainly designed to meet the needs of individual learners (Mergel, 1998).

From the above observation, one cannot deny that Behaviourism has influence in Computer Mediated Communication (CMC). However, behaviourists have their critics, and challenges to the belief that learning occurs through "classical conditioning", "imitation" and "operant learning" led to the development of Cognitivism (McMahon, 1997).

4.2.2 Cognitivism

Some of the key scholars in cognitive theory are J Bruner and Jean Piaget (Kearsley, 2009). The core difference between Cognitivism and Behaviourism is that Behaviourists are more concerned with observable behaviour whereas the Cognitivists focus on mental processes. However, Cognitivists and Behaviourists both believe that the environment influences one's behaviour and the use of "reinforcement" but they differ in the way they use it. For example, Behaviourists use it for motivational purposes whereas Cognitivists associate it with feedback. Cognitivists see learning as a process which involves acquisition of information, its storage and retrieval for use when needed (Mergel, 1998). Learnativity (2002, np) asserts that

> "Cognitivists are concerned with study of individuals' perceptual progresses, problem-solving abilities, and reasoning abilities. Cognitive programs are often organized in chunks, and have built-in or learner-generated memory devices to help learners retain and use the information in the future".

Piaget theorised that there are four stages of cognitive development which attempt to explain human learning. These are Sensorimotor, Preoperational, Concrete Operational and Formal

Operational stage. Learning is seen as a systematic and developmental process which gets more complex as one goes through the different stages (Hergenhahn & Olsonn, 2001). Piaget asserts that learners have to be physically and mentally ready (readiness) to learn certain skill at a given stage. In addition, for effective and efficient learning, the learned material should not be too easy nor too difficult (Kristinsdóttir, 2001). Unlike Behaviourists, Cognitivists believe that learners are not passive "*tabula rasa*" but rather active participation in their learning using their past experiences (schema) in order to make sense of their new situations (Mergel, 1998). Through experiments and discovery, learners understand their world better. Kristinsdóttir (2001) therefore, argues that the learning environment should be learner centred where learners are active participants.

Cognitivist Psychology also brought with it the "Information Processing Model" which uses the processes of a computer as a metaphor (Woolfolk, 1998). This has led to the development of some educational principles such as the need for organised instruction, presented in chunks usually from simple to complex, known to unknown to enhance the processing of knowledge (Mergel, 1998) in terms of input and output.

4.2.3 Social Constructivism

Constructivism is a learning theory that addresses epistemological and pedagogical issues (Ismat, 1998). In his theory of Social Constructivism, Vygotsky acknowledges cognitive development but focuses on the role of social interaction and use of language in human learning (Doolittle, 1999).

According to Jaworski (1995, para 8)

> "Social Constructivism is about social relationships, being centrally concerned with "negotiations, cooperation, conflict, rhetoric, ritual, roles, social scenarios, and the like". In this theory, meaning of language is context dependent".

It assumes that learners construct knowledge from their past experiences as they interact with their environment (Matusevich, 1995). Unlike Behaviourists who define learning as transmission of knowledge from various sources to the learners' mind, Constructivists see it as a negotiated process amongst a group of people in a given social cultural setting (Ismat, 1998). In these negotiations one's ideas are challenged, tested and common grounds are constructed (McPherson & Nunes, 2004). Therefore, a social constructivist learning environment is characterised by group work in which learners collaboratively solve real life problems and put emphasis on multi-perspectives (Doolittle, 2001).

The focus of education is to bring change to society through shared meaning (Ismat, 1998). Though learning is seen as a reciprocating process, teachers and knowledgeable learners in any given group of people play an important role in guiding the learning process. Vygotsky calls this the "Zone of Proximal Development" and states that learners can learn things from knowledgeable adults that they cannot learn on their own (Doolittle, 2001). This explains why mentoring plays an important role in Social Constructivist education. Unlike Behaviourism, teachers are not seen as the source of knowledge but rather as facilitators of learning, but just as importantly, they are also seen as learners as well. Their task is to create an environment conducive for critical thinking where learners interrogate what they are learning and allow them to draw their own conclusions (Ismat, 1998).

This school of thought also acknowledges how technological advancement has formed a contemporary culture that greatly influences knowledge development and sharing but emphasises the need for a theoretical framework that takes into account human learning (Doolittle, 2001). In my opinion, Social Constructivism provides the basis for effective and efficient learning by forging learning activities that engage learners in real life contexts otherwise known as situated learning. Unlike "transmission models" which are targeting examinations, Constructivist learning is meaningful because it is relevant to the lives of the learners. This type of learning does not necessarily require face-to-face interaction but social discourse which can be achieved through web based learning grounded in Social Constructivism (McMahon, 1997).

Language is key in articulating ones view of the world and in negotiating a shared meaning of experiences. Social Constructivist education place an emphasis on the need for people to explore their ideas and world views collaboratively, mirroring real life situations in which people work cooperatively for their shared benefit (McMahon, 1997). According to Matusevich (1995), constructivism endorses "self evaluation", "peer review" and is learner centred in nature. It also negates competition among learners which is common in Behaviourist education.

Web based learning does not provide face to face interaction but can encourage social interaction. Development in Computer Mediated Communication has allowed asynchronous and synchronous discussions which can support real time communication. This is all aimed at enabling online learning Communities. These communities include people with different backgrounds and professional and personal experiences which supports "Zone of Proximal Development" (McMahon, 1997).

Technology has affected various aspects of life including education, however educators and other stakeholders in education, need to pay attention to pedagogical issues rather than the technology. The focus should be on how this technology can be used for educational purposes. Matusevich (1995) argues that technology has facilitated good changes in education systems for example the introduction of small working groups, a shift from passive to active learning, and change from destructive competition to collaborative learning. In a nutshell, if used correctly it can strengthen students learning and boost their self esteem.

According to Mann (1994, cited by Matusevich, 1995, para 19)

> "The use of new technologies in an educational setting has caused the theory of learning, constructivism, to receive new attention. Students in these setting become empowered by gaining access to real data and work on authentic problems. Often, roles are reversed as teacher and student learn from one another".

Constructivism also faces its critiques and challenges. In particular an argument is raised that as much as socially negotiated knowledge can challenge conventional beliefs it can also promote the continuation of social ills and prejudices (Ismat, 1998). Multiple perspectives and varied information sources should be used to guard against these issues.

In conclusion, proponents of social constructivist education foster collaborative learning in which learners and their mentors engage in authentic tasks in a given social and cultural context. This environment is learner centred and gives them control over their learning. Constructivism has promising prospects for web based learning and especially with the use of online tools such as the Discussion Forum and the Chat Room that enable social interaction. According to Gergen (nd, cited by Jaworski, 1995, p.24)

> "It is thus that social constructivism seeks to replace the individualistic ideology of the traditional conceptions of knowledge with a communal concern. It is out of the community that rational articulation is archived, and without such articulation there is simple no means of presuming the individual self".

Constructivism has brought some hope to reform online learning environments (Edelson, Pea & Gomez, 1996). According to McPherson and Nunnes (2004), Constructivist learning environments should have 'Rich Environments for Active Learning' (REALS) which accommodate a wide range of learning strategies.

Social Constructivism forms the basic premise of this research as the VCoP develops and people share knowledge through online collaborations and knowledge is constructed in a social group. In addition it empowers learners by allowing them to access information at their

convenience regardless of time and distance. The Zone of Proximal Development means that members of a VCoP can learn from more experienced and knowledgeable members.

4.2.4 Connectivism

Connectivism is a pedagogical view that recognises the cognitive work by Piaget but places emphasis on learning as formation of connections between entities. While the content of what is learned is important, it is equally important for learners to develop connections with other information nodes (Siemens, 2004). Although Connectivism acknowledges construction of knowledge, it puts more emphasis on creation of networks. According to Siemens (2004) knowledge is developing more quickly than ever before and can be found in many sources, people need to connect to these knowledge networks (Siemens, 2006). Stephenson (nd, para 3) argues that

> "Experience has long been considered the best teacher of knowledge. Since we cannot experience everything, other people's experiences, and hence other people, become the surrogate for knowledge. 'I store my knowledge in my friends' is an axiom for collecting knowledge through collecting people".

Stephenson's (ibid) view is that learning is a social process in which people exchange information through connections and they rely on each others for the generation of new knowledge. Siemens (2004) argues that learners need to know how and where to find information. Entities use these connections to share information with each other in a meaning making process. These connections create networks in which information flows and these facilitate the running of establishments (ibid). In return, these institutions give the networks feedback which ultimately enriches individuals. This mechanism enables individuals to update their knowledge which ensures that what is learned is current and relevant to the learners (Siemens, 2006 a).

Unlike Behaviourism where knowledge acquisition is prime, in Connectivism learning entails empowering learners to make decisions about the value of the learned content (Siemens, 2004). Consequently, learning is seen as reorganisation and encoding of the existing information with new information to create new knowledge. This process is influenced by the environment and it includes "exploration" and "decision making". This attribute overlaps with Constructivism and suggests that learners are active participants who continuously engage in their learning which enables them to obtain knowledge when they need it, as opposed to memorising information just in case it is needed in the future. This also means that learners are not just consumers of knowledge but are actively involved in its construction (Siemens, 2006 b).

Siemens asserts that learning is chaotic and complex and therefore should be negotiated among nodes through open learning tools such as blogs and discussion fora, supporting the current shift of online educators who advocate for a move from formal learning structures to informal ones such as learning communities (Siemens, 2004).

Connectivism fits in this study because, like constructivism, it sees learning as a social process. It advocates for collaborative learning through networks which enable VCoPs to develop and share knowledge among members. It also acknowledges the significant role played by mentors in a learning process. The key difference between Constructivism and Connectivism is that the latter assumes that the information flow today is too fast for an individual to process and manage on their own. Therefore they have to rely on technology to record this knowledge and individuals access it via information networks in what Siemens (2006 a) refers to as a "network model".

Though this research has endorsed pragmatic aspects of Connectivism, I do not agree with Siemens' position that knowledge can be found in non-living things. This is dependent on one's philosophical definition of knowledge, in my view and supported by Verhagen (2006), inanimate things such as data bases and information systems can store information not knowledge although knowledge can be created by the development and sharing of such resources. One of the limitations of Siemens' work is that his definition of Connectivism is that although he recognises that knowledge emanates from individuals his theory does not clearly delineate individuals from systems. If there is no distinguishing element the question "how does knowledge exist outside people?" should be asked (Sivan, 2008).

In conclusion, Connectivism advocates for collaborative knowledge development and sharing through networks. The speedy influx of information promotes cognisance of multiple perspectives in Connectivist education. It also promotes the use of flexible learning environments that meet the needs of individual learners. The ability of learners to make connections is an important tool today because it allows them to do so whenever they need information (Siemens, 2004).

4.3 Information and knowledge management

The problems that teachers have with knowledge management are similar to other organisations. Studies reveal that schools do not have clear policies or ideas on knowledge sharing, as a result schools are characterised by conflicts between teachers and administrators (Carroll, Choo, Dunlap, Isenhour, Kerr, Maclean & Rosson, 2003). In addition,

teachers work in isolation even though the resources and knowledge that they develop can be re-used and shared. These problems can be addressed by defining knowledge development and sharing policies in schools (ibid).

Organisations need to work out how knowledge can be shared in a given establishment in order to facilitate its running (Sharratt & Usoro, 2003). Its importance is expressed by Davenport and Klahr (1998, cited by Sharratt & Usoro, 2003, para 3) who state that

> "Unlike material assets… knowledge assets increase with use: ideas breed new idea, and shared knowledge stays with the giver while it enriches the receiver … only new knowledge resources-ideas- have unlimited potential for growth".

Hew and Hara (2007) assert that knowledge and resource sharing is key in the professional development of teachers, because it can improve one's performance. This process can be both formal and informal, however, formal sessions such as workshops have been criticised for providing knowledge which is codified and irrelevant to the situation where it will be applied. Conversely, they argue that informal "social networks" such as a Community of Practice (CoP), address the immediate needs of its members (in their words "just in time" as apposed to "just in case"). Despite this, teachers do not share knowledge for various reasons. Hew and Hara's (2007) research reveals that limited research has been conducted in this area and this has made it necessary for this study to explore how art teachers in Botswana Junior Secondary Schools can develop and share knowledge using a Virtual Community of Practice.

This research draws a distinction between information and knowledge. Information is the raw data which can be expressed in numbers or words where as the latter is an outcome that occurs after translation of data in order to create understanding in a given situation (Baran & Çağiltay, 2006). This understanding is acquired through experience (Dennehy, Morgan & Winston, 2003). According to Baran and Çağiltay (2006) knowledge encompasses acquired information or facts, skills, connections and "principles and laws". Knowing involves having skills to find out how to perform certain tasks when the need arises and this process requires that one should know with whom to liaise when necessary. This whole process occurs best in a "social context" such as a Community of Practice (Dennehy, Morgan & Winston, 2003).

Much work in knowledge management has focused on technology ignoring the culture of users as reflected by massive developments in Information Systems (IS). These systems can only handle "hard" information (Sharratt & Usoro, 2003). Hard information is formal, easy to articulate and can be easily "captured", "codified", "saved" and "transferred". This type of information can be shared easily through use of databases and books. "Soft" knowledge, which is core in this research, is informal, very difficult to articulate and cannot be codified. It

includes aspects such as skills, expertise and problem solving. This type of knowledge is kept in individuals and being very difficult to share in the current information systems it can be best constructed and shared through extended collaboration experienced in Communities of Practice (Hildreth, 2004). Therefore, knowledge cannot be shared like information but people can share their experiences in communities that through engagement help construct knowledge. However, this research will use the term "Knowledge Sharing" to distinguish between information and knowledge sharing (Dennehy, Morgan & Winston, 2003).

In education, new teachers learn in the field by collaborating with others. They acquire hard knowledge from printed documents such as books and policy documents. They learn tacit knowledge through interaction with others. It is from this view that social collaboration is important for developing and sharing tacit knowledge hence the growth of Community of Practice (Baran & Çağiltay, 2006). According to Brown and Duguid (2000, cited by Baran & Çağiltay, 2006, para 15).

> "Only by engaging in work and talking about the work from inside the practice, one can learn to be a competent practitioner. Practice is an effective teacher and community of practice is an ideal learning environment".

4.3.1 Community of Practice

There are several definitions of the concept of a Community of Practice, for instance:

> "Communities of practice are groups of people who share a concern or passion for something they do learn how to do it better as they interact regularly" (Wenger, 2006, para 3).

> "At the simplest level, they are a small group of people… who've worked together over a period of time. Not a team not a task force not necessarily an authorised or identical group…They are peers in execution of "real work". What holds them together is a common sense of purpose and a real need to know what each other knows" (Brown & Gray, 1995, p.3).

> "Communities-of-practice are informal networks that support professional practitioners to develop a shared meaning and engage in knowledge building among the members" (Zarb, 2006, p.10).

The above three definitions have a lot in common. First, they all see a CoP as a group of people with a "common ground" (Hildreth, 2004). They also talk about interaction over a period of time. Brown and Gray (1995) point out that CoPs can be either formal and/or informal. The catch word "real work" denotes that members of these communities share

practical experiences that they encounter at work. Zarb's (2006) definition also brings in knowledge building and sharing which is the focus of this study. According to Wenger (2006) members of the community identify themselves through common interests. The community is built by knowledge sharing through their collaborative interactions and they are practitioners who share knowledge and work experiences in order to improve their practice and these make a Community of Practice. This was illustrated by Tremblay's (2004) research when participants perceived their CoP as a "problem solving" mechanism.

The concept of Community of Practice was introduced by Jean Lave and Etienne Wenger in 1991. When it started it was based on the concept of apprenticeship and it has grown to infuse other modes of learning. New members learn through extended interaction with older and more experienced members and this moves the status of new comers from "peripheral" to "full participation". Participation is the heartbeat of the community which legitimises their membership in their community (Kimble, Hildreth & Wright, 2001).

When Wenger developed the concept of CoPs, it was based on face-to-face interactions, however, debates have arisen question whether CoPs can exist in geographically dispersed communities. Sharratt and Usoro (2003) argue that although there are differences between face-to-face and virtual environments, people can effectively share knowledge through Computer Mediated Communication (CMC) such as emails and bulletin boards. According to Zarb (2006, p.12)

> "Virtual Communities of Practice are informal networks, existing outside of any particular organisation, that support professional practitioners to develop a shared meaning and engage in knowledge building among their members by providing opportunities for relationship building and interaction through the use of internet base ICTs as well as other methods".

Zarb's definition, like the three discussed previously, accentuates "common ground" and "knowledge sharing" among its members. The key difference with VCoPs is that communication is mediated through computers via the internet. However, virtual communities can still engage in face-to-face interactions and they can be used to establish a sense of identity and trust among its members. Identity and trust are seen as being crucial for the establishment of a VCoP (Zarb, 2006).

The development of communication technology has allowed the growth of CoPs in other parts of the world. Some of the successful CoPs are Harvard's Education with New Technology, Learning Circles, Middle East Technical University's Professional Development Circle (PDC) in Turkey and The Math Forum. They all serve different purposes for example the Math Forum is a space for maths teachers in which they develop and share resources and ideas on how to

teach and learn the subject (Baran & Çağiltay, 2006). One of the key values of a CoP is that records of interactions help with retaining "soft" knowledge when workers leave their jobs. In addition, sharing experiences and knowledge with colleagues enhances productivity (Tremblay, 2004).

4.3.2 Importance of sharing knowledge in a CoP

Informal learning has been marginalised both in educational institutions and other establishments. This has affected its use and development in learning. There is an obvious need to recognise the important role played by informal learning and to encourage the use of informal learning approaches such as those in a CoP (Boud & Middleton, 2003).

Gannon-Leary and Fontainha (2007) argue that CoPs have become popular due to their key role in coordinating research activities across the globe. Experts in specific fields conduct their research projects in collaboration with like minded people irrespective of distance, boundaries or time. The system provides social networks which are effective and efficient which makes research work accessible to many people and the developed work has broad scope because it's a product with collective input. According to these authors (ibid) another advantage is that VCoPs tend to have less hierarchical relationships than those that occur in face-to face interactions. Instead relationships are based on members' contribution to their communities, not there status in the company.

4.3.3 Motivation for participation in knowledge sharing in a VCoP

Ardichvili, Page and Wentling (2003) conducted a study on Caterpillar Company's knowledge sharing through a Virtual Community of Practice. These authors stated their research findings indicated that Caterpillar workers were motivated to participate in knowledge sharing for different reasons. One of the reasons was that these members perceived knowledge as a public commodity, and therefore, shared it in order to benefit the community as a whole. Some members of the community had achieved job satisfaction and, as a result, they felt that they can "give back" to the community by sharing their experiences with others in the VCoP. Less altruistically some shared it because they believed that participating in the VCoP would empower and enable them to be experts in their own field.

The research findings showed that participants viewed the systems as some form of "encyclopaedia" that is readily available for users. They also saw it as a "problem solving tool" in which participants post their problems and get answers from others. Solutions provided by

other participants meant that this system allowed users to get specific solutions from experts. The system updated participants of the developments in practice. It also managed a wide range of areas and interests of different practitioners simultaneously. The use of online communication tools such as the discussion forum allowed users to conduct meetings online which minimised the need for face-to-face interactions (Ardichvili, Page & Wentling, 2003).

Another advantage of the system is that, as an open communication tool, it enables new members of the community to be assimilated into the entire community quickly and this enhanced productivity by providing unlimited access to experts and information databases. This quality facilitates collaborative communication and work in geographical dispersed areas. It is also effective due to easy links to other communication channels such as email, listserves and websites. While these collaborations provide solutions to specific problems, such solutions can be helpful to other in similar scenarios and finally, discussions among members breed new knowledge (Ardichvili, Page & Wentling, 2003).

Individuals usually express different sources of satisfaction in a VCoP. Tremblay (2004) conducted research in several Communities of Practice in Canada. The research findings indicate that members of a VCoP were happy to share work experiences with others and this helped them solve their work problems. Most of them stated they were happy that they learned a lot from each other. Others specified that working in groups enabled them to arrive at solutions as a team and that this collaborative work enabled community members to acquire new skills. One key observation in this research was that younger participants, those below the age of 50, were most likely to be pleased with the above listed attributes (ibid).

4.3.4 Barriers that hinder participants from using a VCoP as a source of new knowledge

Researchers have identified various issues that create barriers to participation in both face-to-face and virtual CoPs. For instance Ardichvili, Page and Wentling (2003) look at these issues in terms of a CoP while Gannon-Leary and Fontainha (2007) identify much the same issues in a VCoP.

According to Ardichvili, Page and Wentling (2003) informal structures may work against the introduction of a CoP where workers have their personal connections and support systems which are perceived as more valuable than the formal knowledge management system. These authors argue for the support of both as, in their view, they are complementary.

Knowledge is perceived by some as a 'personal asset' with competitive value and some CoP members felt they were giving up this asset by sharing their knowledge (Ardichvili, Page & Wentling, 2003). Tremblay (2004) echoes this by pointing out that some community members have the perception that they were not receiving recognition for their contributions, mainly from the employers but also from their colleagues.

Others felt their contribution would be insignificant and irrelevant and could work against their professional image (Ardichvili, Page & Wentling, 2003), especially if they were perceived as displaying ignorance of information that they should know. New members were particularly susceptible to this as they felt threatened by old members and were afraid they would be criticised (Ardichvili, Page & Wentling, 2003).

This area of trust is highlighted when people state they only share with people they know personally which can be a challenge in a strictly online CoP. Gannon-Leary and Fontainha (2007) state that collaboration in a VCoP can only function effectively where there is support and communication with other participants. In a VCoP where communication is predominantly online which raises that concern that communication without face-to-face interactions can lack trust and this, in turn, results in weak bonding among members. Online communication is often associated with misinterpretation of messages due to lack of verbal cues experienced in face-to-face interactions (ibid).

In addition, Gannon-Leary and Fontainha (2007) point out that membership in a VCoP is dynamic and members move from the 'peripheral' to 'full participation', while some membership is short lived. These continuously changing roles affect the activities of remaining members.

Time is an additional common element. Ardichvili, Page and Wentling (2003) claim that the need for an immediate solution is also perceived as problematic as a CoP can provide multiple options and unclear solutions which require time to resolve. Tremblay (2004) states that VCoP participants felt they did not have adequate time to participate as their VCoP activities were additional to their daily tasks and duties.

From an organisational point of view security and confidentiality is a major concern as the open nature of the learning environment prevented participants form sharing sensitive information in the system (Ardichvili, Page & Wentling, 2003). This is also raised by Gannon-Leary and Fontainha (2007) who state that inter-communication between different institutions can make sharing of material difficult due to legal issues such as intellectual property rights.

Finally, Gannon-Leary and Fontainha (2007) argue that some online users may have limited computer skills which can limit their participation especially when some subjects require intricate skills to articulate the problem in the system.

4.3.5 Elements necessary for a successful VCoP

According to Sobrero (2008) a VCoP should have the following attributes in order to function successfully; namely "leadership", "Negotiation of a mutually beneficial enterprise", "Establishment of reliable technology and support", "Building trust and respect through social engagement" and "Maintaining strong leadership and Momentum".

Leadership/champion: A leader in a Virtual Community of Practice is an individual, or a few individuals, that initiate its formation in order to address issues of common interest. The leader(s) is responsible for the formation of the site, the identification of its members, and all other arrangements necessary for its full operation (Sobrero, 2008). When leaders form a community they essentially guide the formation of an existing social network and bring it to life. The structure of the community should be flexible and at the initial stage it should be geared towards bringing new members and allow them to shape the structure as the community grows (Wenger, Dermott & Snyder, 2002) Depending on the location of community members, it is common in VCoP for members to be in a group of people that have not met face-to-face (Sobrero, 2008).

Negotiation of a mutually beneficial enterprise: A Community of Practice is formed due to common interest and enthusiasm in certain areas which motivates them to participate (Sobrero, 2008). This stems from leadership that guides activities of the community as it grows and changes its functions. In order to achieve this community members collaboratively negotiate and define their purpose, composition of its members, operations in order to deepen their understanding of their community for mutual gain. These interactions enable members to make their contributions and consequently realise the value of their Community of Practice (Wenger, Dermott & Snyder, 2002).

CoPs are grounded on Constructivist theory and therefore the community negotiates the material to be discusses in order to keep its activities in focus. This bonds members together and strengthens their "legitimacy" to their community. This changes constantly as the group goes through different stages of its development (Sobrero, 2008). While it is good to exploit ideas of its members, it is equally important for a good community of practice to explore good ideas from other communities and infuse them in their development (Wenger, Dermott & Snyder, 2002).

Establishment of reliable technology and support: Communication in a VCoP is dependent on the technology that supports collaborations. For smooth operation it is crucial to ensure that community members have relatively uniform internet access, suitable hardware and compatible software (Sobrero, 2008). The system should be easy to use and enable sharing of tacit knowledge (Sharratt & Usoro, 2003). In addition, the system should be fast and have reliable connectivity (Sobrero, 2008). Most online communications tools include email, chats, use of documents, use of both audio and video technology and these enable both synchronous and asynchronous communication. Video technology plays an important role where face-to-face is not feasible. It enhances trust among community members and this bonds them together which ultimately breeds good working relationship. Some of the factors that affect Virtual Community of Practice are poor internet access, lack of the necessary technical support (ibid).

The above outlined problems can be solved by ensuring that leaders and core members work out programs suitable for their community. This also includes scaffolding new users of the system and thrashing out the areas to be discussed by the community (Sobrero, 2008). "Leaders" and "initial members" go through training and where necessary some trial exercises as this process requires skills to support collaborative learning and interactive learning which is suitable for an online learning environment. It is also important to employ a wide range of methods in order to cater for users with different preferences (Johnson, 2001). Once these are done they come to a final agreement on the choice of hardware and software necessary for online communication. As a result, this will facilitate the functioning of the community (Sobrero, 2008; Johnson, 2001).

Building trust through social engagement: One of the key benefits socially in a Virtual Community of Practice is the establishment of trust among its members through collaborations. Through these they negotiate and discover their common interest which builds the group identity (Sobrero, 2008). Community of Practice should allow both private and public platforms for discussion. Private ones help members to address their individual problems, such as technical problems, on a one-to-one basis. In the process, involved parties get to know each other and this strengthens trust among the concerned parties which ultimately enhances events in the public discussions. Events of the public discussions are further discussed in one-to-one networks. It is, thus, considered very important that facilitators in a CoP ensure they create both private and public spaces in order to facilitate lively participation. (Wenger, Dermott & Snyder, 2002).

The relationship and trust that are built in such an environment enable members to develop and share knowledge openly. According to Nichan and Hung (2002, cited by Sobrero, 2008), trust is the glue that binds the members of a community to act in a sharing and adapting manner. Without trust, members would hoard their knowledge and experience and would not go through the trouble of sharing with, or learning from, others (Sobrero, 2008).

Although trust can be developed through online engagements, face-to-face interactions achieve that quicker. Virtual communities have been challenged whether they can support development of trust among its members. Consequently, VCoPs make an effort to conduct face-to-face meetings in order to establish trust. Video conferencing is used in instances where face-to-to face is difficult to conduct. Therefore Virtual Communities of Practice need to employ a wide range of tools approaches such as video conferencing and face-to-face to build trust among its members (Sobrero, 2008).

In a CoP learning is seen as a social negotiation in which community members learn from each other collaboratively. This approach negates the traditional approach of learning which promotes "transmission" of information and rather advocates for social engagement in the development and sharing of information and knowledge. Studies indicate that in New Zealand, VCoPs in education allow members to collaborate at all levels and this has strengthened trust and relationship in the educational structures as a whole. Trust is a central key in encouraging the participation of members which ultimately improves their practice (Sobrero, 2008).

Maintaining momentum: In order to keep the collaborations going a leader needs to be vigilant and understand the nature of the CoP and how it operates. In that way they will be able to entertain the needs of the "core", "acting" and the "peripheral" groups which will keep the rhythm of the community going. In addition they should be able to deal with the dynamics of the community and ensure that all members feel that they are legitimate members. This should be accompanied by giving members responsibilities which will bring them closer to the core of the community (Wenger, Dermott & Snyder, 2002).

4.4 Development of a solution

Within the framework of Constructivism and Connectivism there is enough compelling evidence and prior research in best practices, to indicate that the development of a VCoP could address the current problems faced by educators in Botswana as outlined in Chapter 3. However, the development had to be constrained by certain practical elements as reported below.

4.4.1 ICT "landscape" in Botswana

Botswana is one of the democratic states in Africa with competitive Information and Communication Technology in government ministries and other sectors (Fombad, 2005). Telecommunication infrastructure is state owned and run by Botswana Telecommunication Corporation (BTC). The monopoly of BTC and its perceived unsatisfactory service has triggered a call for the privatisation of the industry. One of the major efforts in addressing service delivery problems is the introduction of Botswana Telecommunication Authority (BTA), an independent body that regulates telecommunication affairs in the country (Botswana Telecommunications Corporation, 2007).

Telecommunication in Botswana was once run by a British cable company on contract from 1980 to 1995 and today is run mostly by local companies. It has reached a telephone density of 5.92 per hundred population which is comparatively good in the region (Economic Commission for Africa, 2002). However, the fibre SDH network is concentrated in the eastern part of the country extending from Ramatlabama (South African border) to Ramokgwebana (Zimbabwean boarder); hence it covers the big cities of Gaborone and Francistown and some big villages along the region (Botswana Telecommunications Corporation, 2007). Telecommunications are using Very Small Aperture Terminal Satellites (VSAT) to improve connectivity in rural areas especially those that are distant and difficult to access. In 1998, BTC was providing Internet Service Providers (ISPs) a bandwidth ranging from 128 Kbps to 512 Kbps (Economic Commission for Africa, 2002).

The use of emails was delayed due to high cost with early access beginning at the University of Botswana before expanding to other institutions and individuals. Other problems include urban and rural divide, high cost of computer equipment and shortage of electricity in some villages (Shafika, 2007). The high cost of computers means that for every hundred people only three own a computer (ibid). A combination of some of these problems and the expanding need for better connectivity are additional factors that justify the need to privatise BTC. The assumption is that privatization will enhance telecommunication services especially as the government of Botswana believes that ICT is instrumental in the development of the country and its entire population. (Botswana Government, Ministry of Works, Transport and Communication, 1995).

These problems have contributed to the "late start" in the use of ICTs within the country, however, as the Botswana Government and the Education Ministries are committed to expanding connectivity to schools and villages it is hoped that the bandwidth and other issues

will improve. In the meantime it is advisable that "early adopters" learn from other countries and make a concerted effort to adopt technologies that meet their needs within the current practical constraints.

4.4.2 Choice of platform

There are number of open source and other freely available resources available that could have been used in the development of this VCoP. However, it was decided to use the University of KwaZulu-Natal's Open Learning System (OLS) as the University blocks access to most social network systems during key parts of the day. A system was required that would be available to me, in my roles as researcher and key motivator, on a twenty four hour basis. In addition the system had to be adequately password protected to ensure confidentiality for the participants. Using a local system meant that there was technical advice on hand should problems arise and most importantly, the tools offered by OLS did not differ greatly from those of other systems, and it is not a particularly bandwidth heavy application.

4.4.3 Initial design

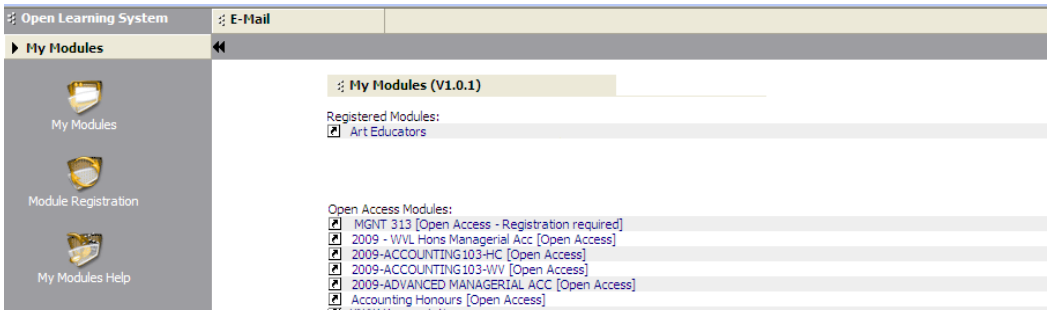
Initial facilities offered in the site included facilities for confidential logins, threaded discussions, a chat room, tools for graphic uploads to display art work and two general information areas, one giving links to other sites and another where information could be added as the Community engaged in various topics. It was considered important to keep these as easy to use and functional as possible without bombarding the participants with too many choices particularly as the system is easy to use and could be modified at any time to add additional tools or facilities as the need arose.

The screens were considered easy to navigate, and bandwidth kept to a minimum. Once the participant had typed in the URL in their web browser they were taken to the login screen:

Figure 4.1: OLS login screen

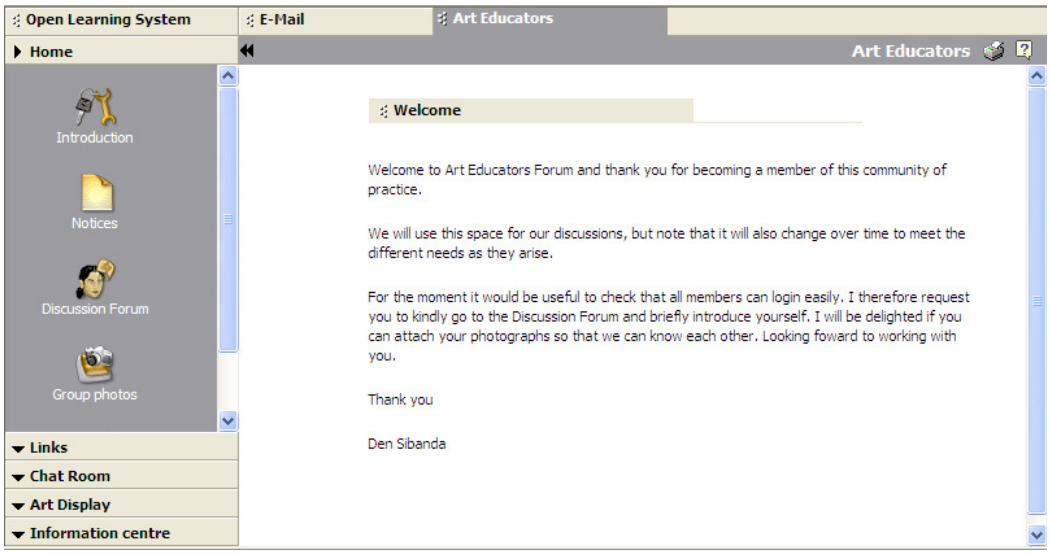
They were then expected to type in their "user name" as prompted for the guest users, thereafter they were taken to the OLS opening screen. Participants in this area would have seen a screen similar to the one below, with access to the Art Educators "course" offered at the top of the options.

Figure 4.2: OLS opening screen



Clicking on "Art Educators" took them to the site where they could participate in all activities.

Figure 4.3: Art educators' site



The link to "Notices" took the participant to a screen where I, as key facilitator, could load messages in much the same way as one would place notices on a board in the staff room, drawing participants' attention to up coming events. This was the only one-way communication option in the site.

Figure 4.4: Notices screen

The discussion forum option opened a threaded discussion which was considered easy to use and facilitated asynchronous communication by keeping threads of the discussion in clearly marked groups. Highlighting a message would open it in the bottom half of the screen and the participant clicked on "reply" to post a return message. Note that in Figure 4.5 the names of other participants have been blocked out to comply with research confidentiality issues.

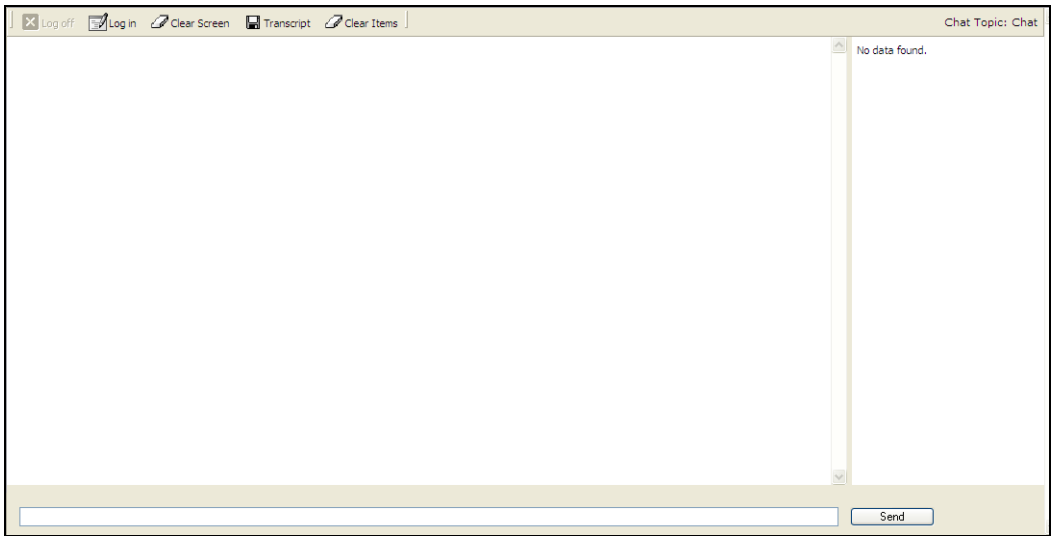
Figure 4.5: Threaded discussion forum

Participants were encouraged, but not compelled, to send photographs of themselves which were added to the site to personalise the interactions. Once again the image displayed here has been doctored to protect identities.

Figure 4.6: Photographs

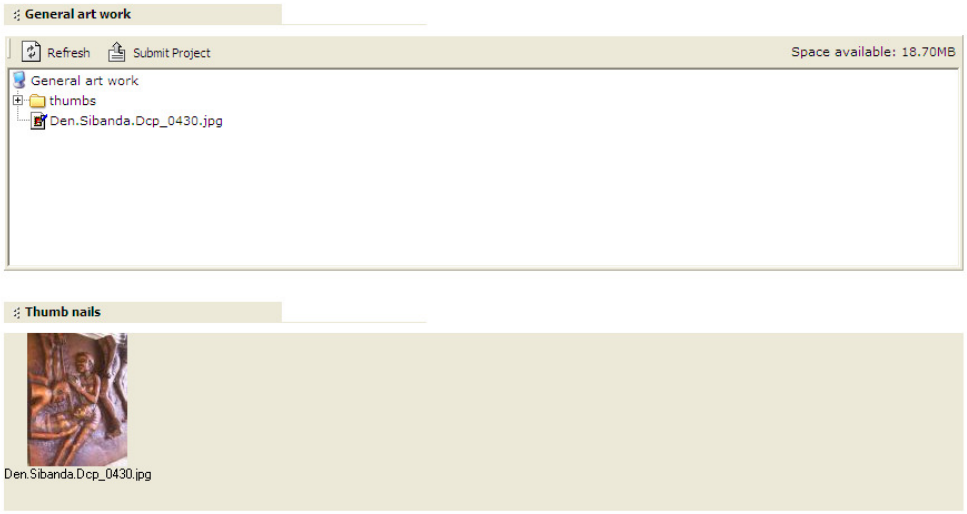
The chat room was used for synchronous discussions. It required the participant to click on the logon button, type the message at the bottom of the screen and respond to messages as they were entered. Transcripts of chats could easily be stored and kept for later use by the community and for analysis in this research; however original transcripts are not included as an appendix as they also hold confidential information which would be in breach of the confidentiality agreement.

Figure 4.7: Chat room



It was also hoped that the site could be used to display art work by the participants, either for discussion of their own work, or to display issues they were trying to deal with in the classroom. Figure 4.8 below depicts one art work that I loaded as an example.

Figure 4.8: Art display



The information centre was not used during the course of this study.

4.5 Difficulties experienced by participants

One of the difficulties with the designed site was the login procedure. As OLS was the online learning management system at the University of KwaZulu-Natal access was protected via the

LDAP login procedures. Participants did not have direct access and had to be registered as "guest" users whereby a series of steps had to be taken, resulting in the system sending a system generated password to the participant. Thereafter the participant had to remember to use their email address and nonsensical password to gain access. On first entry the system prompted participants for general details in order to populate the database and they then had to login a second time.

First time users found this laborious and difficult. Much time was spent on cell phones and using emails to resolve login problems. However, once they had gained access, participants appeared to find the system easy to use.

4.6 Conclusion

Using existing tools to develop a solution was not a difficult task. As mentioned earlier there are numerous options available. It was however important to take care that the solution was secure, reliable and allowed the types of interactions that the literature identified as useful and encouraged communication. The extent to which this was achieved is discussed in the next chapter.

Chapter 5: Evaluation and testing of solutions in practice

5.1 Introduction

Once the VCoP was available participants made an enormous effort to engage in the system, some travelling long distances and incurring personal expenses related to transport, cell phone calls and internet cafes. Without this enthusiasm and input very little would have been achieved. The resultant communications and sharing were, in my opinion, extremely helpful. In order to present the activities fairly and raise some concerns as accurately as possible the data was entered in QSR NVivo™ and coded according to themes as they became evident in the analysis process. There were instances where themes overlapped, for instance the technologies used were greatly influenced by skills, required support and access.

5.2 Technologies used by teachers

VCoP members showed that they were able, at times with difficulty, to learn to use all tools offered by the VCoP and other technologies. More importantly they used different tools such as email, cell phones, discussion fora or chat rooms, depending on specific circumstances. Generally all participants stated that they preferred OLS tools to other communication tools because of its user friendly interface and wide range of options. Johnson (2001) argues that this preference for such a suite of tools is flexible and caters for users with different needs.

5.2.1 Cell phones

At the beginning all members used cell phone sms(s) and emails to support the formation of the VCoP. Emails were especially useful in assisting members with the login process. Only once everyone was able to access the system, was communication mainly conducted through the use of the Discussion Forum and the Chat room, reverting to the use of cell phones when they encountered connectivity problems. As a backup communication system cell phones, although expensive to use, were useful in updating members who had unreliable access, keeping them informed about activities and allowing them to report their problems. According to participant 5, "*I think is more like a backup system, if they is a problem with communication via OLS, cell phone is like a backup*".

Some issues were reported via cell phone, for instance participants 15 and 17 (who are not included in the 13 successful participants as they were able to login but did not participate in the VCoP activities) respectively state that

> *I'm nt 2o busy as such, d only thing dat waries me is d net itclf, its vry slow 2 an extend dat search tym collapses b4 d results could b successful. I pay p15 an hour.In our skul is nt available yet . Im sori 4 reportin late*
>
> I am not too busy as such, the only thing that worries me is the internet itself. It's very slow to an extent that searching time collapses before the results could be successful. I pay Botswana Pula 15 an hour. In our school [it] is not available yet. I am sorry for reporting late.

> *Our net is stil down ths y kudnt't cum on but will try public net*
>
> Our internet is still down that is why I could not come on but will try public internet

Cell phone sms(s) were handy for organising synchronised activities such as chat sessions especially for those who had to travel long distance to access the internet from cafes. They were also suitable for travelling members especially those who were in places where they could not access the internet, for example, it was observed that participant 2 was attending a workshop and could not access the Discussion Forum but he used cell phone sms(s) to follow developments of the discussions.

5.2.2 E-mail

Similarly, emails were used for backup when the system was causing problems. Using email participant 9 stated

> *Den,*
>
> *My dear brother, Let me apologize profusely for my failure to log in.*
>
> *In the past one week I have tried at least 4 times to do so unsuccessfully. I was using the password you gave me. It is so distressing when you want to do something within a limited time with failing results over and over. What am I doing wrong? Can you please help me log in tomorrow evening? We can make an appointment.*
>
> *Thanks*

5.2.3 Threaded discussions and chat sessions

The Discussion Form and the Chat were the main means of communication and emails and cell phones sms(s) were supporting technologies. The choice of OLS as a delivery tool was thus partially vindicated as it was flexible because it had a wide range of tools that supported

both synchronous and asynchronous communication. The tools were used to enable group work, specifically its threaded Discussion Forum helped members follow the discussions easily and members could get immediate responses through the chat. The threaded discussions allowed participants to read and post messages in their own time allowing them to engage in complex discussions.

Knowledge sharing in face-to-face interaction occurs due to conversations among its members. Conversation is thus seen as instrumental in knowledge sharing as members negotiate issues and collaboratively share experiences. It was observed, and Sharratt and Usoro (2003) concur, that the same conversation and knowledge sharing can be experienced in a Virtual Community of Practice via the above listed technologies. This sentiment is also shared by Brown and Duguid (2000, cited Baran & Çağiltay, 2006). This collaboration was evident when the research showed how members supported participant 9 on how to best run the news letter in his region and how moderation of practical examination can be improved using the threaded discussion options.

Another unexpected but pleasing observation was that teachers organised their own personal meetings on a one to one basis in the chat room.

5.2.4 Preferences for specific tools

Technologies were used according to their functionality and the needs of the participants. On the one hand threaded discussion forum enabled members to follow discussions easily at their own time, allowing participants to engage in complex and extensive discussions which required more time and also acted as a form of record keeping which users could revisit when necessary. According to Daniels and Pethel (2005) it is a "great place to park information". On the other hand, the chat room was useful for meetings which required immediate feedback such as the one in which they brainstormed ideas for the logo design. Participant 6 further argued that this chat tool allowed discussions just like regional face-to-face meeting that they have currently. It was also particularly useful for those that had to travel long distances as they did not have to do another trip to get responses.

Participant 6 stated that he preferred the VCoP to the current system because it is cheaper and art educators could engage in collaborative work without leaving their duty stations. This meant a cut in travelling, accommodation and other related expenses. In addition, there was no teaching time lost.

Participants 3, 4, 5 and 8 claim that OLS system was "transparent" and "specific because [in their view] it was designed to address identified issues which kept the discussion in focus". Thus it could be argued that OLS was easier to use and better suited for sustained group work, than emails as the threaded presentation made the topic easy to follow, unlike emails with segmented messages. The other reason why participants gave for their preference of OLS was that it was, in their view, a better tool than sms(s) for group work. Cell phone usage incurred personal cost, is expensive and usually used for one-to-one communication.

Another advantage was that the Discussion Forum gave participants enough time to take part and as a result the experiences shared were extensive as compared to the Chat Room. Participant 9 also acknowledged that the Discussion Forum allowed "lurking" which permitted an individual to learn quietly in the background without any pressure. This was particularly evident from the concluding interviews when participant 8, who was not active in the Discussion Forum, indicated that he followed the discussion by making references to issues raised. Lurking is thus shown to be a legitimate practice that caters for those that cannot engage in the discussion for various reasons but can still learn from others.

Four participants stated that though they appreciated using the Discussion Forum they were fascinated by the Chat Room. This was primarily because it was instant and they felt that it increased participation level as members interacted in real time and they could responded to issues as they arose making the chats lively. This tool was particularly suitable for those who had unreliable access to the internet especially those who used expensive means such as travel long distances and using cell phones to access the internet. These challenges forced such participants to have irregular visits to the OLS making chats with their instant feedback ideal for their situation. Nonetheless, they managed to take part successfully and this improved when some schools received their internet connection.

However, it is important to note that despite participants' claim to preferring the Discussion Forum and Chats within OLS for knowledge sharing its success was dependent on support through email and cell phone sms(s).

5.2.5 Other potentially useful tools

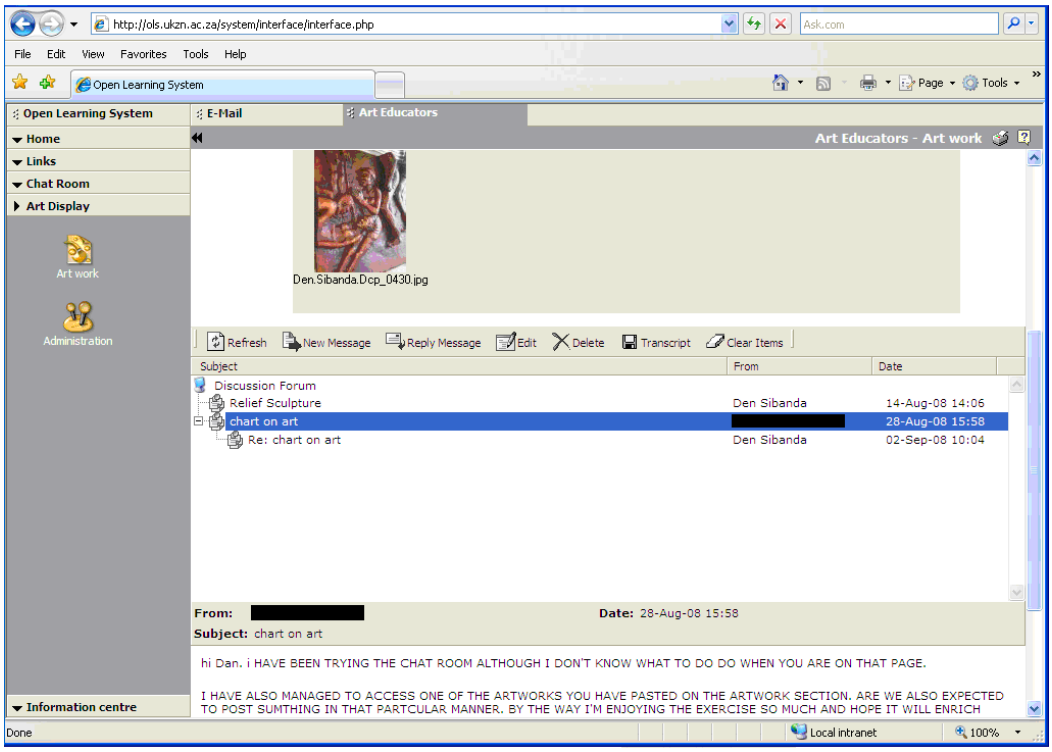
There are many other tools that have potential for further exploration. It was observed that while interactivity is crucial in a VCoP, other tools offer information links such as text displays for Notices, Links for resources, photos upload and display were useful as well. It was, repeatedly, found to be helpful to post notices for participants especially when there were urgent messages that needed to be seen.

The art gallery was an image and text upload tool designed to display art works with a provision for art critiques and discussions. Although other participants did not share their works in this space, they showed interest in developing such a resource in which they can discuss art works. It was observed that participant 2 was interested in displaying some work. He states that

> *I have also managed to access one of the artworks you have pasted on the artwork section. Are we also expected to post something in that particular manner? By the way I'm enjoying the exercise so much and hope it will enrich most of us.*

Such a resource could be useful in discussing a specific aspect of the displayed art work as illustrated in Figure 5.1.

Figure 5.1: Use of art display



The use of good quality pictures could foster discussion related to the standardisation of practical examination, art critique, or as a visual aid resource. Members of this VCoP engaged on a similar project in which participant 1 shared information about Mmasechele rock art in Manyana. Due to unreliable internet access and limited resources such as a Digital camera, the community could not take digital images in time for further discussions in the system, but despite this, the activity allowed participants to identify this resource and share information

on rock art and the culture around it. If this is fully supported it can facilitated the development of a digital gallery of rock paintings and other related visuals which could be used for educational purposes. In addition, some members of the community were not aware of this rock art site and following the discussions they were planning to take their students there.

Although other displays were not adequately exploited, there is room for exploration particularly with the development of the resource centre as some schools do not have good libraries. Participant 4 states that

> *Well, if I was in a job in Rakops. You know and I had good internet access - this would be my sole means of communicating with the rest of the world, especially the art community and art educators, and even to obviously get images of art.*

This is supported by participant 11 who states that

> *…actually if you are far away where there are no libraries nothing than you just get in the site and get information even about things which are happening in the ministry, sometimes you are far away you do not know what is happening, you don't even know if there are any exhibitions going around …*

5.3 Problems faced by teachers

Participants were generally affected by similar problems across the country including unreliable internet connectivity, time and work constraints as well as limited ICT skills.

5.3.1 Unreliable internet connectivity

Although the country is in the process of installing internet in all schools, unreliable internet connectivity was one of the major hindrances. The internet was down more often than it was up in most schools and as a result participants had to use internet cafés which made this exercise expensive, time consuming, and difficult for affected teachers. Participant 8 says

> *The online connection at my school is not reliable so I was often forced to utilize alternative facilities which I had to pay out of pocket*

5.3.2 Access to internet connected systems

Teachers in some rural areas did not have access to an internet café which prevented them from taking part while others were forced to access internet provided by cell phone companies. Participant 7 states that

> *I had to purchase airtime for my phone to access O.L.S in my P.C. this was not cheap.*

This also brought its own challenges such as unreliable, slow and expensive service. If problems occurred here the service providers were slow in responding as they claimed their priority was directed at voice calling.

Some teachers had school related restrictions that limited their internet access. In most cases computers were located in places such as the school library which were inaccessible after working hours. In some schools teachers had to compete for the internet with students, making it difficult to plan time in advance or spend prolonged time on the system. While some schools had support system in their schools, unfortunately others did not and this made this exercise a bit frustrating for some.

5.3.3 Time

Working conditions posed challenges for participation in particular their heavy work load. Teachers were involved in a number of extra-curricula activities including running workshops, preparing for regional, cluster and national exhibitions and participation in various professional committees. Participant 5 states that

> *"…sometimes it really gets busy in schools that you no not find time to log in and find out what's happening…"*

They felt that this was one of the major factors that hindered teachers from carrying out their duties well, and that hindered their participation in initiatives such as the VCoP. It was observed that Participant 2 was not actively involved in the discussion because he was attending two workshops at the time which made it very difficult for him to take part in the discussion hence his "lurking".

These difficulties are not unique to Botswana; Tremblay's (2005) research in Communities of Practice in Canada revealed that participants were not allocated time for CoP activities. He argued, however, that if they were motivated enough they used their spare time as they valued the collaborations.

5.3.4 ICT skills

A number of participants were also limited by lack of ICT skills, including basic computer skills and very little knowledge of online communication. According to Participant 5

> *Initially I was hindered from communicating in the VCoP because I really did not know how to use it. I did not know much about it.*

Correspondingly participant 11 added that this was mainly because teachers were not exposed to online learning at colleges during their training. Their lack of experience was evident at the beginning of this research as several of them did not have email addresses which were necessary for OLS login. This lack of ICT skills is also evident in first world countries as discussed by Gannon-Leary and Fontainha (2007) where they state that in the United Kingdom practitioner computer skills are not complete. However, it was observed that participants gradually acquired basic skills for sharing and there were signs of improvement.

5.4 Motivating factors

Participants were motivated to participate in the VCoP for various personal and professional reasons, however, almost all of them wanted to take part in a social network in which they could share day to day work experiences and solve real work problems. According to Ardichvili, Page and Wentling (2003) this enables members to present their problems and get solutions from experts, making it a readily available "encyclopaedia". The participants saw it as an alternative approach that could alleviate communication challenges that they encounter in the practice/current system. According to participant 6

> *I am just motivated by the love of technology and to me [a] Virtual community of Practice can be of great help as we are experiencing communication hindrance where am currently working, to me it can grease things up*

Participants, as observed by Ardichvili, Page and Wentling (2003), felt that they had a moral obligation to work collaboratively with others in order to improve the practice for the benefit of all. Participant 4 was moved by his experience of teaching in a remote area where he worked in isolation with limited resources. His participation in this VCoP was intended to share such experiences with the hope to offer solutions for teachers in similar situations. He says that

> *I would have thought if people were very remote then they would really want to use this facility, so I would have thought it would have been a good case*

where if everything was working and functioning that they would enjoy to use it and communicate with other people outside of that remote area

The above quotation suggests that if the necessary technology for a VCoP is available for people in remote areas they will be motivated to use it because it will be a better option than the current system for sharing with other teachers.

Just more than half of the participants had an interest in technology and had some experiences with the internet. These people perceived their participation as a way of imparting their skills to other members and facilitating their own professional development through social networking with other educators. In addition participant 9 was keen to be a member of this Community of Practice because this as an "*intriguing development*".

However participants cautioned that generally teacher motivation is determined by the perceived benefits of the activities that they engaged in. Further role out and research would be required to see if the motivation recorded expands with larger groups. Participant 11 warns that

"Teachers are not motivated and they do not care".

5.5 Zone of Proximal Development

Participants 2, 3, 4 and 9 played Vygotsky's mentorship role in which more experienced people guided inexperienced participants. In addition, Social constructivism also puts emphasis on collaborative work in which people address real life problems by sharing their experiences. (Doolittle, 2001). According to participants 6, 10 and 11 they see a VCoP as a meeting place for people of common interests where they solve practical problems effectively and efficiently because they deal with experts directly.

Almost all participants felt that they learned something from interactions in the VCoP despite limited internet access and having members with different backgrounds. Participant 3 does not have a graphics background and states he learned about logo design from more knowledgeable members. Participant 6 said he had learnt new methods of communication such as synchronous chats, which he says has "*broadened*" his "*scope*". Participant 8, who is relatively new in the field, stated he benefited a lot from this project in that

…at first I thought this was meant for those who are just new in the field through this I learned that a lot of people are in this and they have a lot of experience and through what they shared with us, for instance in moderation.

In addition, she even suggested that the system be introduced to all teachers in the country a sentiment shared by almost all members. However, they all felt that they could have learned more if the participation was more active that it was. Despite this, the research revealed that knowledgeable members (mentors) play an important role in knowledge sharing in a VCoP and this role was successfully played by participant 9.

Although it was observed that some teachers were relatively newly qualified educators they had excellent skills in certain fields and they were equally resourceful as other members. Some of these participants were teacher assistants before they attained their formal qualifications and the experience they brought from their earlier teaching days were evident and crucial in the discussions.

5.6 Geographical isolation

Botswana, like other countries in the region, is characterised by rural-urban divide with relatively poor developments and services in rural areas when compared to the urban settlements (Shafika, 2007). Despite government development efforts, participant 6 asserts that some Junior Secondary Schools in Botswana are still powered by generators which run on scheduled hours and at times they don't work at all. This has severe implication for the use of technology in such areas. Although internet facilities are being installed in schools, all participants argue that most of the schools with poor facilities and services were in rural areas whereas those in cities had relatively better services. Participant 6 states that

> *…in a rural area which is very poor in terms of transport, no electricity or generators used for power source (they are not reliable) hence communication tools like the internet, fax machines cannot operate for teachers to use to share knowledge with others.*

Half of the participants had no internet café in their remote area as a result they had no alternative access point when the internet was down at school. Participants 7, 10 and 11 used the cell phone network to access the internet and they had difficulties with connectivity. The service provider stated they could not address their problems because there were too few people who used the service. Despite these challenges, these rural teachers managed to take part and some travelled to neighbouring villages to access the internet.

It was also observed that most teachers accessed the internet from schools and therefore they could not access it during vacations because they travelled to different remote

destinations such as home villages, lands and cattle posts where they is no connectivity. Participant 5 says

> *It is that time of the year that you leave the busy stressful life of the urbanites and retreat home, to a small quiet village, without the noise, hassle, stress and speed of civilisation. Including electricity, phone lines, tarred road, computers and of course internet!*

All participants argue that a VCoP could serve as a supplementary information and knowledge sharing tool to enabled teachers to operate from their duty stations, cutting down the long travelled distances. This saving on travelling time allows them to use time effectively which means no teaching time need be lost. Therefore this provided a more effective and efficient tool for information and knowledge sharing as compared to the current traditional systems. According to participant 9

> *…it enables an easy interaction and continuous discourse amongst the members thus creating an efficient, reliable and sustainable flow of ideas.*

Despite the challenges faced in rural areas all participants felt that once the internet is provided then a VCoP will be ideal to network teachers in the field. Participant 4 states that

> *So that information is passed on and you've done that very simply, you've bridged thousands of kilometers.*

Participant 3 indicated that the VCoP could help bridge the gap experienced by rural schools saying

> *It will definitely reach the most remote corners as and as long as it gets to the most remote corners it will help the people the same as it would those in the city.*

5.7 Types of information and knowledge shared

The system facilitated the sharing of both 'hard' knowledge (information) and 'soft' knowledge (skills).

5.7.1 Hard knowledge

All participants also felt that the system was helpful for updating members on the general activities such as exhibitions, visits, examinations and moderation. In one particular discussion participant 1 told of his visit to Mmasechele rock paintings in Manyana. Discussion about its usefulness as a resource ensued and information was given about its location and

procedures to be taken to organise a visit to the site. Due to unreliable internet access and limited resources, the community could not share digital images for further discussions, but despite this, the activity allowed participants to identify a resource and share information around it. It is envisaged that in future a digital gallery of rock paintings could be developed for educational purposes, especially for those schools at too far a distance to organise visits.

Other hard information shared related to information such as the developments in new syllabus, and examination procedures. Participant 11 pointed out that most schools in rural areas have poorly resourced libraries and the system could be used to access resources and government documents essential for their operation.

Participants 5 and 6 state that there are currently problems such as delayed or lost correspondences. Participant 8 believes that the new system could address this by storing records in the system. These reports are more secure and comprehensive as compared to reports given by individuals after attending a workshop.

5.7.2 Soft knowledge

Soft knowledge was also shared. At one stage participants raised concern about budgeting and noted they sometimes had to purchase art supplies from their own pocket. More experienced participants were able to give advice about budgeting and how school budgets work in general so the new teachers could make use of other sources of money.

Various activities also helped some participants engage in developing their own skill set. Participant 4 commented that when they worked on logo design it involved a wide range of skills such as sketching, scanning, formats and sharing it online, and participant 3 says of the logo design activity

> *I was able to understand they way in which most of the members were agreeing on approaching this thing… graphic is not one of my strong areas I must say and I was able to follow, I was able to get a lead of how… along what line I should be thinking when I design that kind of thing.*

Discussion about the moderation of examination work was another topic that required careful consideration. Some teachers had been angered by what they considered the wonton destruction of students art work. Others were able to inform these teachers about the reasons for the procedure and together they were able to discuss alternative methods of marking.

5.7.3 Continuation and expansion of formal meetings

Participants generally saw the VCoP as a system that could enhance communication between practitioners after formal activities have taken place. Participant 4 states that

> *certainly if Virtual community of practice could contribute to that knowledge and cascade it - better. And it could reinforce what people have learnt at workshops, there could then be discussions about that so it's not just getting forgotten.*

Participant 3 felt that the VCoP technologies could be used to 'broadcast' workshops in real time or keep them stored for later re-use.

> *…for art that will be exceptionally useful because if you are having a workshop for example and we operate in front of a camera that would be able to feed to the members.*

Although this is unlikely in the near future as Botswana continues to face the challenge of low bandwidth. However, it was observed that the VCoP successfully facilitated sharing of both information (hard knowledge) and specific skills (soft knowledge) which had only been available through face-to-face interactions

5.8 Supporting the Government vision

The VCoP development was timely and inline with the aims of the National Vision 2016 which is documented as a broad vision in which the country hopes to create "an educated, informed nation" where "[a]ll schools will have access to computers and to computer-based communication such as the internet" (Botswana Government, Task Group, 1997, p.5). Although the installation of computers and internet connectivity is still in progress some participants were able to use such facilities to access the VCoP. It can thus be argued that this VCoP or similar technologies could be used to facilitate the realization of some aspects of the country's vision, especially as participants were able to show they developed skills on a need-to-know basis, and share both hard and soft knowledge effectively.

5.9 Enhancing the current traditional methods of knowledge and resource sharing among teachers?

All participants interviewed favoured the VCoP and saw it as a valuable approach to information and knowledge sharing among teachers. This was because of its advantages over the current system including that it is open and readily available to members. Unlike

workshops, it allowed members to interact when there was need to address a specific problem. Participant 5 states that

> *Obviously I will prefer the VCoP, obviously I do because it is there throughout anytime you need help, any time you need to share its there and you use it. I think it is the ideal instrument for sharing information*

The system documented the discussions which served as resources for other users at a later stage. According to participant 4

> *"…it could reinforce what people have learnt at workshops, there could then be discussions about that so it's not just getting forgotten."*

According to participants 3, 4, 6, 7, 9 and 10 the VCoP can accommodate a large group which gives every members of an establishment a voice regardless of geographical location unlike the current system in Botswana schools. A view shared by Johnson (2001) as this makes VCoP discussions richer, because contributions come from a wide range of people with different backgrounds.

Almost all participants claimed that VCoP is more convenient than existing communication systems at it allowed members to access the site in their own time which accommodated teachers with different roles and responsibilities. Participants also felt that this was suitable for shy and quieter individuals since it allowed them to time to consider their responses. Participant 5 states that

> *It is at a time that is convenient for you and you are at ease if, probable … may be you are a shy person, you don't like company… you are a bit of an introvert… you can just sit behind the PC and actually express yourself in the best way possible with all the time in the world*

Another advantage was that participants felt they could choose to conduct their activities in either a formal or an informal manner including both simple and complex discussions.

Participants 7 and 9 stated that the VCoP is more personal that the current system as they could direct their questions and get quick feedback from specific individuals unlike the representative approach experienced in the current system. Participant 6 says

> *"It can be a reliable mode of communication being fast, reliable and time saving".*

5.10 Fostering professional relationships

Members had different professional and personal backgrounds. Three participants did not have adequate internet access to allow extended collaborations which are essential to establish a working social network and as a result they could not create strong connections with other members. However participants 6, 8, 10 and 11 assert that their involvement exposed them to new ways of knowledge sharing irrespective of distance which broaden their scope hence their participation. Most of them felt that this re-united them with their former college mates and colleagues. It also introduced them to new members which created new connections which they used for networking. Their interactions enabled them to know each other which made it easier for members to know who to approach for a specific problem. Participant 11 states that

> *I was interested to see teachers that I was in College with and those were some people I knew they were mastering, they were masters in some certain skills or categories of art so that gave me comfort that if I had problems and if we had such kind of a site I will be able to reach so and so wherever he would be or she would be and would be discussing this that actually bothers me.*

Similarly participant 8 states

> *"I have learned that other people somewhere know or can help me with something that I don't know or when ever I need help faster".*

As discussed in the literature review, these connections are crucial in this era when knowledge changes rapidly. As illustrated by the above participants, social networking and collaboration play a vital role in knowledge sharing (Siemens, 2006 b). Participants 7 and 8 claimed that their experience of the VCoP showed them the value of collaborative work. Participants 1 and 11 extended their connections to their colleagues who were not taking part in the research by sharing their VCoP experiences and art skills with them. Sharratt and Usoro (2003) assert that such collaborations enrich and breed new knowledge.

Participant 10 stated that this enhanced his team work in "authentic tasks" and working with people of different backgrounds. In addition, this also honed participant 2's online communication skills. Almost all participants learned through these discussions that every teacher has challenges and this helped them appreciate the nature of the practice. Teachers appreciated sharing work challenges with others and exploring how others solved their problems. Participant 10 states that

> *The different members will admit to the fact that there has been improvements to the personal developments of each individual who participated in the VCoP.*

In addition, it was also observed that this promoted trust and confidence on members which ultimately strengthened their bond.

5.11 Working relationship among participants

The working relation between members was professional and well bonded. According to participant 5, 7, 10 and 11 this was due to sense of a common goal which motivated participants to take part in the discussions. This, together with extended collaborative work and support for each other, resulted in the establishment of trust and respect among members and thus created a supportive working environment. These aspects are an integral aspect of a Community of Practice which fosters sharing. Nahapiet and Ghoshal (1998, cited by Sharratt & Usoro, 2003) states that "Where relationships are high in trust, people are more willing to engage in … cooperative interaction".

Participant 8 added that she used to be reserved and worked in isolation for a long time but the system opened her up to the community. The environment was friendly and accommodated people of different calibre and background who were prepared to share their expertise. Participant 7 states that "*It's been a great experience, the members were calm and collected people, it was more like a team working towards a certain goal*". This sense of "common goal" occurs as a result of trust and respect which is developed by conversations through the Community of Practice (Sharratt & Usoro, 2003; Hildreth & Kimble, 2004; Wenger, 2006).

5.12 Key factors necessary for sustaining this VCoP

Factors necessary for sustaining a VCoP identified by participants were similar to Sobrero's (2008) attributes identified in the literature review. In brief these included "leadership", "Negotiation of a mutually beneficial enterprise", "Establishment of reliable technology and support", "Building trust and respect through social engagement" and "Maintaining strong leadership and Momentum".

5.12.1 Leadership

Participants 2, 3, 5, 9, 10 and 11 strongly believe that one of the essential aspects that will facilitate smooth functioning of a VCoP is establishment of a good policy and the identification of a person to take a leadership. Participant 3 states that

… there might be a need for a community manager… and that community manager should be the person who would be managing what takes place there.

They feel that in order to form a VCoP, it should be well marketed at the Ministry of Education and endorsed as policy but spearheaded by teachers to meet their needs and to ensure ownership by community members. The leader would coordinate efforts of the key stakeholders which will enable establishment of the system across the country in a manageable fashion. While it is important to involve the officials at the Ministry of Education, the above participants felt that a leader can be an experienced teacher or group of teachers in online learning. Participant 9, however, expressed the opinion that it should be someone based at Ministry of Education whose role would be to monitor and coordinate the activities of the community. The research findings are in agreement with Sobrero's (2008) that a VCoP needs a leader that coordinates community activities. It also supports Wenger, Dermott and Snyder (2002) that the formation of the VCoP must be flexible and this was also expressed by members that teachers and officers at the ministry need to collaboratively negotiation its formation, structure and operation for its smooth running.

5.12.2 Negotiation of a mutually beneficial enterprise

Participant 4, 5, 9 and 11 stressed the need for the negotiations between teachers and the administrators at the Ministry of Education in the formation and running of the VCoP. This formation should be backed by dedicated members, good policy and leadership. Participant 2, 3, 4, 5 and 9 emphasise the need for the leadership to recruit and to train members on online communication. Once recruited, they should plan activities for the discussion together in order to create a "common ground" which will bond members together and to keep the activities in focus. In addition, participant 4 and 5 assert that for the VCoP to function well it should address practical needs of its members as this will improve participation. Participant 4 states that

Any collaboration which is organised through the website… then people are getting sort of tangible results from using it. So if they can see a worth in it then they'll maintain their loyalty.

Wenger, Dermott and Snyder (2002) as well as Kimble et al (2001) concur that such collaborations are essential for the transition of new members from "peripheral" to "full participation" which is instrumental in the formation of the VCoP.

5.12.3 Establishment of reliable technology and support

Almost all participants had problems with internet access and as a result they all stressed that for a VCoP to function well there should be enough fast computer for teachers with reliable and fast internet connection. In addition, participant 4 and 11 felt that teachers should have computers in their offices and internet connection at their homes for unlimited accessed with government subsidy. Participant 4 states that

> *…they should all have computers, they should all be in their offices whether they want them or not, they should all be connected to the internet and they should all be functioning. And they should all be networked to each other throughout the school so I think that was what the technology was there for.*

The need for comparable and compatible software, hardware and internet service stated above is equally emphasised by Sobrero (2008) who states that this technology should support both synchronous and asynchronous discussions through a wide range of tools in order to meet the needs of members especially where face-to-face meetings is very difficult to conduct. Participants 2, 3, 4, 5 and 9 state that in addition to the procurement of the necessary software and hardware the system needs support. This should take the form of ICT training which a major challenge is for most art teachers in Botswana. Participant 5 states that

> *I think there should be a lot of educating on the VCoP. A lot of us don't really know about it. If you do not know about it how are you going to know how to use it and whether we can have access to it? I think if you know about more and how it works and how it operates it will actually motivate us to want to find out what happens and participate.*

Although training is necessary, technical support is also needed by community members as they interact with the system. This is a challenge that affected many participants and some of them, like participant 10, relied on their colleagues who had ICT skills for technical support. In addition, their limitation was also observed during login when I provided support to participants. Despite this, it was also noted that the government is in the process of providing technicians in school which benefited some such as participants 5. This should benefit related systems in the future.

5.12.4 Building trust and respect through social engagement

It was observed that the interaction of members in the system improved gradually with time. This was facilitated by extended collaborations which helped the community define their interests which ultimately strengthened their trust as indicated buy their intensive

engagement in issues of concern. Participant 4 adds that the friendly atmosphere also enhanced the trust and contribution of members in this VCoP, "*I feel by sharing ideas informally we have bonded considerably*". Sobrero (2002) also discusses how conversations help the community identify its interest and unifies its members. This was also observed when members of this research first introduced themselves and later brain stormed topics for the discussion. Wenger, Dermont and Snyder (2008) argue that a Community of Practice needs both private and public fora to address both their personal and group needs.

It was observed that members used the private communication options when they had technical problems. The public fora were used for addressing issues of common interests. According to Wenger, Dermont and Snyder (2008), and as observed during this research, the private space allowed individuals to know each other gradually and develop trust that ultimately facilitated knowledge sharing. Therefore, these two platforms are essential in the development and operation of a VCOP.

While there is need for the two domains, in some instances I brought up pertinent issues from the private to public space with the consent of the participants in order to benefit the entire community. The example below is an email sent by participant 3 which was later brought to the Discussion Forum for further discussions.

> *2008/09/23 10:12 PM*
>
> *Hi Den,*
>
> *Yes I managed, and strange enough my approach was the same as that which failed last Thursday. However I managed to read the discussions, I also noticed my name appeared as if I logged in successfully which was not the case. Anyway, I intend to work on some logo ideas and present them ASAP.*
>
> *Chao*

This benefited the rest of the community because other members encountered similar problems and making it public made them share their challenges freely. Obtaining permission from the concerned participant displayed respect for members which is also a crucial component of VCoP which later breeds trust. While this is possible, one of the roles of a leader is to know that a VCoP needs these two domains but should also know when, and how, to move things around for the benefit of the community.

5.12.5 Maintaining strong leadership and momentum

Wenger, Dermont and Snyder (2008) argue that a leader is responsible for the formation of the community and establishing all the necessary technology. Once it is up and running, it needs an energetic and initiative leader to maintain its operation. I concur with the above authors because I played the role of a 'leader' in this VCoP. A lot of time and energy was expended in the formation of the community and facilitating participants login into the system. I continued facilitating its operation by guiding the discussions and attending to problems experienced by participants. One of the unique encounters was when the discussion became heated over moderation of practical examination as mentioned on page 70. My role as 'leader' in this case was to calm the emotions down and to instigate constructive discussions which came up with alternative solutions to the problem. Participants 2, 3, 5, 6, 7, 11 believe that leaders play a key role in guiding the activities of the VCoP. They had mixed feeling about its form and in view of the Botswana system, leading to the argument that leadership should adopt both informal and formal structure in order to strike a balance between ministerial support for VCoP and it successful operation.

5.13 Suggestions for improving participation

Participants had a wide range of suggestions for improving sharing of information and knowledge through a VCoP. All participants felt that teachers can share better if they are provided with all the necessary resources such as computers and participant 4 recommended that teachers be offered packages that can help then purchase their own computers. According to participant 6 schools should be well networked with reliable power supply to run the technology unlike the current situation in which some school run on generators.

All participants also strongly suggested that for sharing to take place smoothly, schools should have reliable internet connection. Participant 4 feels broadband will facilitate the connectivity and that teachers should have these facilities in their offices. Members general felt that reliable access to the internet and facilities will motivate teachers to share information and knowledge via the VCoP. Participant 4 states that

> *I think ideally that I just imagine that if everyone had a computer in their office which was online, broadband… I know that this is a very romantic vision… but that could convenience everything*

There was also strong feeling from almost all members that teachers need ICT training. This would expose teachers to basic computer use, online communication, benefits of VCoP and should motivate them to share through the VCoP. In addition, they felt that VCoP should be

assimilated into the education policy for it to be adopted by all art educators. According to 5 this should be "*sold*" to the teachers and run by teachers so that they own it. Participants 2, 3, 5 and 11 suggested that once the VCoP is introduced there should be good support and monitoring of the system to sustain it. According to participants 2, 3, 4 and 5 teachers should use VCoP to address real work problems such as conducting collaborative work in preparing examinations, schemes, share visuals, share resources which will compel members to visit the system. Participant 4 states that

> *Any collaboration which is organised through the website… then people are getting sort of tangible results from using it. So if they can see a worth in it then they'll maintain their loyalty.*

Other suggestions by participant 4, 5, 6, 10 and 11 are that it will facilitate the use of VCoP if student teachers are introduced to the system while still studying in colleges and universities. In that way their mastery will get better when they get to schools. The research revealed that participants call for provision of online infrastructure, ICT skill and understanding of VCoP which will drive the thinking behind sharing in such a setup.

5.14 Formal versus informal structure

Participants had mixed feeling about whether the VCoP should be formal or informal service. Most of them, but especially participants 1, 3, 7, 10 and 11 felt that if structured within the Education Ministry, it would involve many people giving it a better composition and scope. If it were informal, people were concerened that some people may not know about it and be left out. Most of these participants felt the VCoP could be adopted as part of the education policy and this would make it a reliable communication system which could benefit all in the practice. Supporting this opinion, participants 2, 6, 9 and 11, argued that the VCoP should include the officials at the ministry as this would help them monitor the developments and challenges of the education system which in turn could facilitate better solutions and provision of support systems. Participant 2 states that

> *So I feel it needs a lot of formality and let even the education officers get involved not only monitoring but participating in such a program would again give them that knowledge of what needs to be improved and so forth.*

However, other participants, including participants 3, 4, 5, 7, and 9 felt that it should be kept informal. They argued that teachers could participate freely, on their own initiative, without any intimidation from the Ministerial officers. Leaving it informal would mean that members join on voluntary basis which would work better because the VCoP would constitute

interested members which will make participation and monitoring much easier. Participant 5 says

> *… I think if it is informal and is teacher to teacher I think we feel freer and we share more because there is no intimidation that I anticipate from education officials.*

Participant 4 further argues that exclusion of officials will make the VCoP focus on art issues as opposed to administrative issues. Participant 4 continue to claim that the inclusion of the Ministerial officers could bring in a 'tension' that would be contrary to the friendly atmosphere that enhanced the unity and participation of members in this VCoP. He says that "*I feel by sharing ideas informally we have bonded considerably*".

As result participants 5, 7, 9 opted for both formal and informal fora to cater for both teachers only and teachers with supervisors. According to participant 5

> *I prefer the informal one. Maybe if we have to include educational officials it should be maybe in another sphere.*

Although informal organisation has its own benefits, it will probably be essential to draw in administrators as stakeholders of the systems but this should be done with great care so that their presence does not limit the participation of members. It was observed that Botswana institutions are very formally structured and therefore, the establishment of a VCoP should fit in this culture and still maintain the informality necessary for a VCoP to function successfully. Boud and Middleton (2003) conducted a study in various institutions including educational institutions, and their findings indicate that people at work learn from both formal and informal structures. They further stressed the need for recognition of informal education which is found in Community of Practice (ibid).

5.15 The importance of the VCoP

Participant 4 and 10 saw the VCoP as system in which teachers can solve real work problems and make decisions that affect their practice. A good example was when they engaged on issues pertaining to Moderation of practical examination. Participant 5 states that

> *The moderators mutilated and killed the artworks in paper two. They wrote on all artworks with permanent markers, and tore the sketchbooks right down in the middle. Apparently bcoz [because] some teachers recycle projects! The students were significantly demoralised by this, since we always give them their projects in paper two. This time they had nothing to show for it. I wanna [want] believe it had an effect on their performance in paper 3.*

The above extract illustrates that teachers were not happy with the way the examination art works were handled. Using this as an example, participants 4 and 10 claimed a VCoP could be used as a problem solving mechanism because they used it to discuss the above outlined problem and came up with several possible solutions for the problem. This collaborative learning in conjunction with "authentic tasks" forms the basis of Vygotsky's social constructivism which underpins this study. It emphasised group work and negotiation of practical solutions to real work problems and fosters multi-perspectives to gain insight to actual issues (Doolittle, 2001). According to participant 11 these collaborations were very useful especially for newly appointed teachers who were posted in isolated locations. The other importance of the system is that it makes the information and knowledge accessible to all members all the time. In addition, extended discourses lead to both personal and professional development of participants.

The VCoP also created a social network which provided a support system for teachers which was cheap, effective and efficient. It is also suitable for shy people because it allows them to share knowledge with others in their private space without any of the pressure experienced in face-to-face communication.

5.16 Conclusion

As a participant observer I was encouraged by the comments made in the final interviews. Even people who had not taken a highly visible role in the VCoP talked of the experience with enthusiasm. Of particular interest was that they continued to use the system for sometime after the formal closure of the data gathering exercise.

The next, and final chapter, reflects on the development and use of the VCoP in terms of the research questions and attempts to promulgate some design principles that can be used in future VCoPs in Botswana.

Chapter 6: Reflection

6.1 Introduction

One of the major challenges affecting information and knowledge sharing in Botswana is geographical disparities. This has made sharing very difficult if not close to impossible in some areas forcing art teachers to work in isolation. This has negatively affected the welfare of the program and the practice. This is mainly because currently communication is conducted through face-to-face communication which works but has proved to have a lot of limitations that hinder sharing due to distance, expenses and time. However, this research does not intend to replace face-to-face interactions rather to complement them and support discussions that emanate from them providing a sustainable information and knowledge sharing system among art teachers in Botswana.

The research also revealed that beside the geographical problem there were common challenges that also hindered sharing. These ranged from lack of ICT skills, poor internet connection, lack of computers, inadequate ICT/sharing policy, shortage of teachers and high work load. Despite these conditions, a VCoP was established and it operated successfully. It was composed of teachers with different experiences with more experienced ones playing a role of a mentor which was designed to guide the less experience teachers in the VCoP. Members established good trust amongst each other and actively took part in the formation of topics for discussions and the discussions.

6.2 The research questions

The intention of this research was to investigate how a VCoP could be designed to facilitate communication, information and knowledge sharing amongst art educators in Botswana Junior Secondary Schools. The sub questions outlined in chapter 1, page 3 are discussed below.

6.2.1 Which technologies could be used for communication in a Virtual Community of Practice (VCoP) and what, if any, are their preferences?

Participants showed that, despite their lack of ICT skills, they were able to learn to use all the technologies presented to them. While preference was given to both threaded discussions

and chat sessions it should be noted the use of these needed to be supported by "older" technologies such as cell phone text messaging and email. Tools were generally preferred according to their functionality, but an unexpected outcome was the preference given to synchronised chat sessions by those participants in remote rural areas. Once the need for instant feedback was clarified in terms of the distances travelled to access internet cafes this was no longer surprising.

6.2.2 What are the problems that limit/hinder the use of ICT in sharing of knowledge and resources among art teachers in Botswana schools?

Access to the technology was the major stumbling block for participants. This included a lack of, or poor, internet connectivity, little technological support at the schools and access to equipment. Schools that have connected computers often only make these available in student laboratories making it difficult for the teachers to access the equipment.

Bandwidth issues were also a problem, with some participants reporting very slow response rates. This also limited the technology available to them. Some participants suggested that streaming videos or podcasting of workshops would be a feature they would like to see in future.

Time was another key element identified where teachers have heavy workloads and their spare time often being eroded by extra curricula activities. Suggestions were made that participation in a VCoP should be "timetabled" into their activities which would highlight the importance of the system but also make officers aware of the need to provide teachers with the necessary equipment.

6.2.3 Given the geographical isolation of Botswana Schools, is a VCoP practical for addressing local needs?

Rather than being a hindering element, geographical isolation was a motivating factor. Participants in isolated areas indicated that the VCoP had reconnected them with people they knew in the past and introduced them to people they would never otherwise have met. In addition members from rural schools were able to access information that would not otherwise have been available to them.

6.2.4 How can a VCoP enhance the current traditional methods of knowledge and resource sharing among teachers?

Participants were particularly enthusiastic about ways in which the development of a VCoP could enhance the current methods of information and knowledge sharing. They suggested that it could be used to inform members of policies, procedures, syllabi, meetings and exhibitions, with all the information in one place accessible at any time.

They also saw it as a useful mechanism to continue with initiatives identified during workshops so that the skills and knowledge could be developed further and not put to one side.

The participants also found access to more experienced teachers very valuable, and the more experienced teachers commented that they too learnt new skills. Although this was not stated in theoretical terms by the participants, social constructivist educational theory was applied and greatly enhanced the experience for all participants. This is echoed in the literature when it is advised that a VCoP should be guided by a theoretical framework that informs decisions on how the technology should be used. Cohen (1987, cited by Amory, 2007) argues that technology often has little impact in education because of a number of reasons including, 1) the perceptions by society that knowledge is objective, 2) society perceives teachers as the source of knowledge while learners are passive recipients, 3) teachers beliefs differ with recommended best practice use of technology. When developing a Virtual Community of Practice, in particular, it is important to adopt a constructivist or connectivist approach as the appropriate theoretical framework to guide the implementation (Amory, 2007; Matusevich, 1995). These theories, as discussed earlier on, perceive knowledge as protean and therefore should be negotiated among stakeholders in any given setting. In addition, it emphasises learning which solves real life problems (authentic tasks) and the use of mentors to guide less experienced members in a given group of people (Ismat, 1998; Dolittle, 2001). Proponents of connectivism, just like those of constructivism, believe that learners are active participants but connectivists put more emphases on creation of new connections which enables members to understand where to get information when they need it (Siemens, 2006 a).

6.2.5 What are the key factors necessary for sustaining a VCoP?

The key factors for sustaining a VCoP were similar to those identified in the literature review, but careful note should be taken that momentum is sustained by ensuring relevance to the

participants. A system that is purely an information source or a one way system for delivering instructions will work against the core elements of a CoP.

6.2.6 Elements facilitating success of this intervention

Participants felt this VCoP was a success because it facilitated collaborative work among members who were widely distributed across the country. Discussion Forum and Chats are important as they allow members to communicate with each other at their convenience. The asynchronous treaded discussion forum is suitable for Botswana teachers because caters for teachers with different schedules. This also gives them adequate time to give a well thought out contribution in extensive issues such as the moderation practical examination, logo design and art supplies. This also favours those who do not have internet at their school as they needed more time to arrange for other options such as the use of an internet café. The synchronous chat is useful in sessions that required immediate responses such as brainstorming topics for the discussions. In addition this was also handy for those who travel long distances to access the internet because it is convenient to arrange for a chat and get instant feedback. Although the VCoP works well it is important to support it with other technologies such email, cell phone sms especially during the formation of the community and when the system is down.

6.3 Theoretical influences required for a successful VCoP

While the above discussed tools are necessary for information and knowledge sharing, it is important to base the interventions clearly within a constructivist and connectivist theoretical framework. This will require some attention to ensure a break away from the more traditional top down management style prevalent in Botswana.

6.4 Recommendations for implementation in Botswana

This research has shown that a VCoP can operate under current conditions in Botswana albeit with certain difficulties. It is recommended that a broader role out take place as a joint venture between the Education Ministry and educationalists. Care should be taken that the system does not become too bureaucratic. It is, thus, recommended that there be a section for official business such as policies, syllabi and official communication, and another equally important section for free social and professional networking. The department should also look at supporting leadership in this area by appointing someone to take on the role and

giving professional recognition to the tasks undertaken i.e. freeing up time, giving a stipend for additional costs and recognising this leadership role in applications for promotion.

Access to computers should be seamless so the department can either support the private purchase of equipment or ensure teachers have access to connected computers as part of their daily work duties. Training and technical support should be made available in each school.

6.5 Recommendations for further study

While the experience of these participants reflects and supports the findings in published literature, there are some issues that could influence implementation on a broader scale in Botswana. On a sociological front these include the influence that educational officers would have in an "official" VCoP, the manner in which leadership develops within a VCoP and if it should be a formal position or a natural development from participants. In addition it would be extremely interesting to investigate the motivation for participation in a larger VCoP as the motivating factors for these participants may in fact affect their further participation especially if it is seen as a formal career building exercise. From a technical perspective the nature of technical support offered to participants in general and especially participants in rural areas is likely to influence participation and should be carefully monitored and where necessary researched. Developments in mobile learning and increased bandwidth could also influence participation and buy in.

6.6 Conclusion

While this research is by no means conclusive in its findings, it can be concluded that in the light of the long distances between schools, the use of this or a similar VCoP could facilitate information and knowledge sharing in Botswana. It could provide teachers with a readily available system in which they could collaboratively learn from each other and solve work problems irrespective of time and distance which is vital in the Botswana situation. This would also enable teachers to create connections with other experts and professionals in the practice who could be used as a resource when the need arises. Such social networks can generate diverse opinions which, in turn, can develop into new knowledge essential for professional develop of teachers and the welfare of the practice. In addition, it would also record all the activities of the community which allows users to revisit and manage their events better. All these qualities could enhance the current system and provide a facility that

is relatively cheap, convenient, efficient, and effective and one that is accessible to all stakeholders. Finally, this can also help facilitate the realisation of the vision 2016 which intends to create "an educated and informed nation".

All this can be successfully achieved through a Virtual Community of Practice because as Hildreth (2004, p.63) states

> Knowledge is primarily a function and consequence of the meeting and interaction of minds. Human intervention remains the only source of knowledge generation

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Appendices

Appendix A: Initial Interview Questions

Initial Interview Questions for VCoP Members
Current support system

How long have you been teaching art?

Describe what you know about Virtual Community of Practice?

Have you used online communication tools before?

Which technology do you use in your practice?

Are there any policies that regulate information sharing among art teachers?

What information do you have about knowledge development and sharing?

Do you share information and knowledge with other teachers?

If yes, how often do you do it?

Do you share it amongst a small or large group?

What type of information and knowledge do you share with other teachers?

How do you specifically share information and knowledge with other teachers?

How do you communicate with teachers in geographical dispersed locations?

How often do you meet with other teachers?

What sort of meeting do you attend? Are they formal or informal? And what issues do you discuss in those meetings?

Identify and discuss factors that motivate and hinder teachers from participating in knowledge sharing. Identify and discuss problems that affect knowledge sharing.

Does culture and environment affect knowledge sharing among art teachers in Botswana? If yes How?

How effective and efficient are the current methods of sharing knowledge?

What is done currently to improve the situation?

How can teachers improve the current way of developing and sharing knowledge among each other?

General comments

Appendix B: Concluding Interview

Final Interview Questions_VCoP
Virtual Community of Practice

Can a VCoP play an important role in knowledge development and sharing?

If yes please explain

If not why not?

What factors motivated and/or hindered you from participating in the Virtual Community of Practice?

What can be done to improve teachers' participation in a VCoP?

This VCoP was an informal one, in your opinion should it remain an informal group of participants or would in better to make it more formal including education officials? Explain

What type of information and knowledge did you share with other members of the community?

Did you benefit from working with some more knowledgeable members of the community?

What did you prefer to use to communicate with other teachers in this VCoP? OLS or email?

Explain

What tool(s) do you prefer to use in OLS?

Explain why

Which other technologies/media did you use for communicating with other members of the community? Which communication tools best suited your needs? Explain

Identify major problems that you encountered while participating in this VCoP and explain how you overcame them.

What are the problems that limit/hinder the use of ICT in sharing of knowledge and resources among art teachers in Botswana schools? [Are there any cultural or environmental issues]?

How efficient and effective is a VCoP as compared to traditional/current approaches of knowledge development and sharing among art teachers

How is knowledge sharing in a VCoP different from the traditional approach? In your opinion, what are the advantages and disadvantages of each. Which one do you prefer? Explain.

What are the limitations of the current form(s) of collaboration among art teachers in Botswana Junior Secondary Schools?

How can they be improved

Are there any potentials for VCoP/OLS

If Yes what are they?

If not why not?

How can a VCoP enhance the current traditional methods of knowledge and resource sharing among teachers?

Given the geographical isolation of Botswana Schools, is a VCoP practical for addressing local needs? How it can address issues of time and geographical disparities?

Has your participation in the VCoP affected your practice and professional development?

Explain using examples

Have you created new connections with other teachers and educators? Do you share knowledge with other teachers?

Describe the working relationship with other members of the community following the VCoP?

How can VCoP be made more suitable for the needs of Botswana Schools? Explain

What are the key factors necessary for sustaining a VCoP?

Comments

Appendix C: Regional officer interview schedule

Interview Questions: Regional Educational Officers

Who is responsible for information and knowledge sharing in your region?

Do you share information and knowledge with teachers?

What information do you have about knowledge development and sharing?

What type of information and knowledge do you share with teachers?

How do you specifically share information and knowledge with teachers?

How do you communicate with teachers in geographical dispersed locations?

How often do you meet with teachers?

What sort of meeting do you organise? Are they formal or informal?

What issues do you discuss in those meetings?

Identify and discuss factors that motivate and hinder teachers from participating in knowledge sharing. Identify and discuss problems that affect knowledge sharing.

Are there any policies that regulate information and knowledge sharing among art teachers?

How effective and efficient are the current methods of sharing knowledge?

Does culture and environment affect knowledge sharing among art teachers in Botswana? If yes How?

How can your office improve the current way of developing and sharing knowledge among teachers?

Describe what you know about Virtual Community of Practice?

Have you used online communication tools before?

What technologies do you use in your practice?

Appendix D: Botswana Government Permission

TELEPHONE: 3655400
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REFERENCE E 11/ 17 XXXXVI(09)

MINISTRY OF EDUCATION
PRIVATE BAG 005
GABORONE
BOTSWANA

REPUBLIC OF BOTSWANA

4th July 2008

To Mr. Den B. Sibanda
Molepolole College of Education
Private Bag 008
Molepolole

RE: REQUEST FOR A PERMIT TO CONDUCT A STUDY ON: "THE USE OF IFORMATION COMMUNICATION TECHNOLOGY IN FACILITATING A VIRTUAL COMMUNITY OF PRACTICE (VCoP) AMONGST ART EDUCATORS IN BOTSWANA JUNIOR SECONDARY SCHOOLS"

We acknowledge receipt of your application to conduct a research on the topic mentioned above.

This serves to grant you permission to conduct your study among art educators in secondary schools in Botswana to address the following research objectives:

1. *To form a Virtual Community of Practice (VCoP) among art teachers in Botswana Junior Secondary Schools.*
2. *To identify the tools that the teachers can and like to use for their communication in a VCoP.*
3. *To identify factors that motivate and hinder teachers' participation in a VCoP.*
4. *To evaluate whether the VCoP can facilitate knowledge and resource sharing among art teachers in geographical dispersed communities.*
5. *Investigate if there are regionally specific issues that affect knowledge and resource sharing among art teachers in Botswana and how these can be overcome.*
6. *To establish an effective, efficient and sustainable tool which can improve knowledge and resource sharing among art teachers.*

It is of paramount importance to seek consent from the School Heads of the concerned schools and the respondents and to conduct the study as stated in your proposal.

Please note that this permit is valid for a period of one year effective from 4th July 2008 to 4th July 2009.

You are furthermore requested to submit a copy of your final report of the study to the Division of Planning, Statistics and Research, Ministry of Education, Botswana.

Thank you.

Yours faithfully

B.B. Nduna
For / Permanent Secretary

Appendix E: Executive approval

March 19, 2010

To whom it may concern

This letter serves to confirm that the following research proposal and associated ethical clearance have been approved executively and the student may proceed with his research:-

Student: Mr Den Bushdoctor Sibanda
Student Number: 205526879
Title: The use of Information Communication Technology in facilitating a Community of Practice (CoP) amongst art educators in Botswana Junior Secondary Schools.
Supervisor: Ms K. Murrell

Yours sincerely

Professor R. Teer-Tomaselli

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