

EXPLORING HOW PRE-SERVICE SCIENCE TEACHERS LEARN TO TEACH ENVIRONMENTAL EDUCATION

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FOCUS OF THE STUDY

The focus of this research is exploring the views of pre-service science teachers about how they learn to teach Environmental Education (EE) in Natural Sciences, while they train for the intermediate and senior phases (Grades 4-9) of South African School System.

RATIONALE

- There is a global emphasis to engage with environmental education, based on, among other things, environmental crises related to climate change and environmental degradation.
- School curricular are viewed as one way of making citizens more conscious of environmental issues.
- Environmental education is a relatively new knowledge and skill area for South African teachers
- Curriculum policy stipulates that environmental issues be addressed in a specific manner.
- The views of pre-service science teachers about their experiences when they learn to teach environmental education, was central to this study

PURPOSE/SIGNIFICANCE OF THE RESEARCH

- To promote the Values and Principles of Education Training Policy, stated in the White Paper on Education and Training (1995) in order to create environmentally literate and active citizens.
- To expose the gaps in the content knowledge and pedagogical content knowledge of the pre-service teachers that need to be explored.
- To help curriculum designers to design improved content and concepts; suggested activities: investigations, practical work, and demonstrations; and recommend equipment and resources for teacher education.

KEYWORDS

- Environmental Education
- Pre-Service Science Teachers
- Curriculum and Assessment Policy Statements (CAPS)
- Constructivist Learning Theory
- Zone of Proximal Development

REVIEW OF LITERATURE

Definitions and need for EE

- Environmental Education is aimed at producing knowledgeable citizens who are aware of their biophysical environment, its problems, how to help solve them, and are motivated to solving them. (Stapp, 1969)
- EE provides students with a scientific understanding of the looming environmental crisis around a growing world population and depletion of the earth's resources (Gough, 2006)
- Henegar (2005) - Individuals need to increase knowledge of the environment, know the problems, find solutions and take actions towards solving EE problems

World environmental Crisis

- Environmental problems have reached unprecedented levels to the extent that many (for example, Barry & Eckersley, 2005; Bowers & Apffel-Marglin, 2005; Guattari, 2001) refer to the current state of the global environment as one of crisis (Grange, 2012).
- A crisis might be an indication of impending disaster or could indicate a civilizational threshold whereby outmoded thinking and values are replaced by new ones (or where old values are rejuvenated) (Grange, 2012).
- The world is in an environmental crisis dominated by environmental issues and risks such as global warming, loss of biodiversity, pollution, deforestation, urbanization and many others (Loubser, 2005).

South African policy and constitution's emphasis

- Our Constitution (1996, p:11) guarantees the right to: ... an environment that is “not harmful to human health and well-being” and “to have the environment protected for the benefit of present and future generations...
- The White Paper on Education (1995)
- Hoogervorst (2004) argues that education is the key to ensure that future generations of South Africans will be able to deliver the envisaged by the Constitution.

Low quality of science and EE knowledge and EE skills

- Low quality of science and environmental education in the schooling and Higher Education system (Department of Environmental Affairs [DEA], South Africa, 2010)
- Environmental education is a new knowledge and skill area for all of South Africa's 350,000 teachers (DEA, 2010).

In-service teachers need training

- Teachers need training in all school levels (Mbokazi, 2009).
- Education officials have, with some exception, very little EE knowledge and teachers admit that they leave out content of which they are not sure of (Rosenberg, Ramsarup, Burt, Ellery, & Raven, 2009)

- National Research Plan Human Capital Development Strategy, all found that the foundations of environmental learning in South Africa needed more attention if the environmental sector human capital development needs of the country were to be met within a longer term sustainability paradigm.
- Core to this are two issues, identified in all of the strategic research:
- First, the quality of teachers' knowledge, and teachers' abilities to teach 'new' environmental knowledge; and second, the curriculum content necessary for building national capacity for biodiversity management, sustainable use of natural resources, resilience to climate change challenges, and building a green economy (FUNDISA For Change [FFC], 2013)

SILENCE IN THE LITERATURE

- There are few researches on how pre-service science teachers learn how to teach Environmental Education in South Africa and more especially in the context of the recently launched curriculum; Curriculum and Assessment Policy Statements (CAPS).
- Inclusion of environment and sustainability issues is generally neglected in formal teacher education institutions, and is often 'left to the side' as an extra/separate programme; It is not integral to diverse methods courses, and does not have a strong presence or focus at a broader level either (Lotz-Sisitka, 2012).

THEORETICAL FRAMEWORK

- The study drew on theoretical constructs from constructivist learning theory and Vygotsky's ZPD.
- Constructivist theories agree on two central ideas :
 - ✓ Learners are active in constructing their own knowledge
 - ✓ Social interactions are important in this knowledge construction process (Bruning, Schraw, Norby, & Ronning, 2004).
- We explored how the pre-service science teachers navigated to the 'Zone of Proximal Development'.

WHAT IS ZPD?

- The zone of proximal development (ZPD) is the area between the child's current development level "as determined by independent problem solving" and the level of development that the child could achieve "through adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86) or "what the child is able to do in collaboration today he will be able to do independently tomorrow" (Vygotsky, 1987, p. 211 & 1998b, p. 202).

ZONE OF PROXIMAL DEVELOPMENT (ZPD)

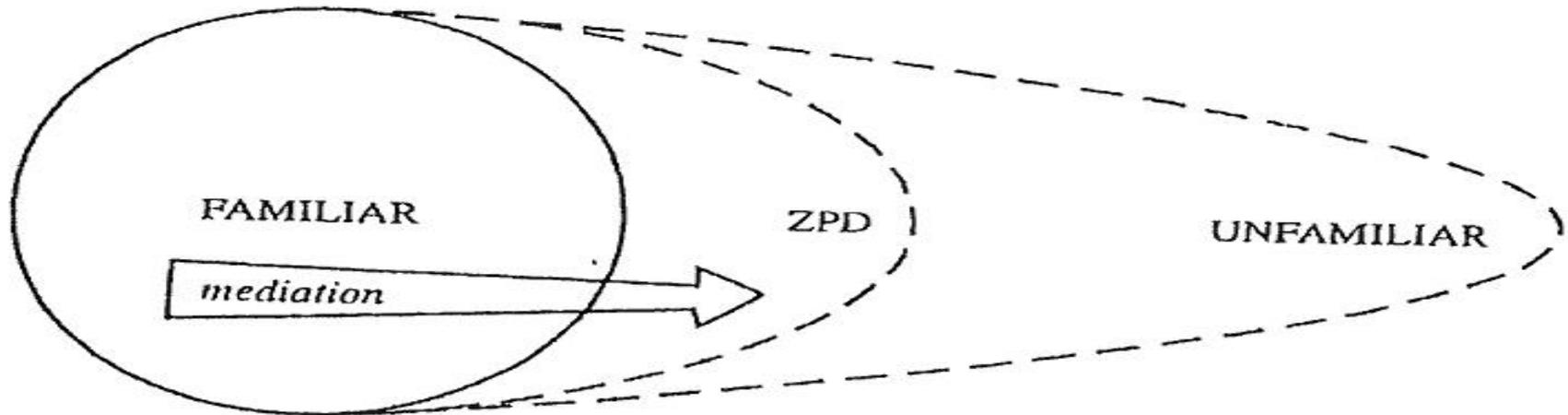


Fig. 1- Zone of proximal development
Donald, Lazarus & Lolwana (2002)

LOCATION OF THE STUDY

- The study was conducted in the School of Education at a tertiary institution in KwaZulu Natal.
- The location is suitable because it is easily accessible; and this makes the study doable.

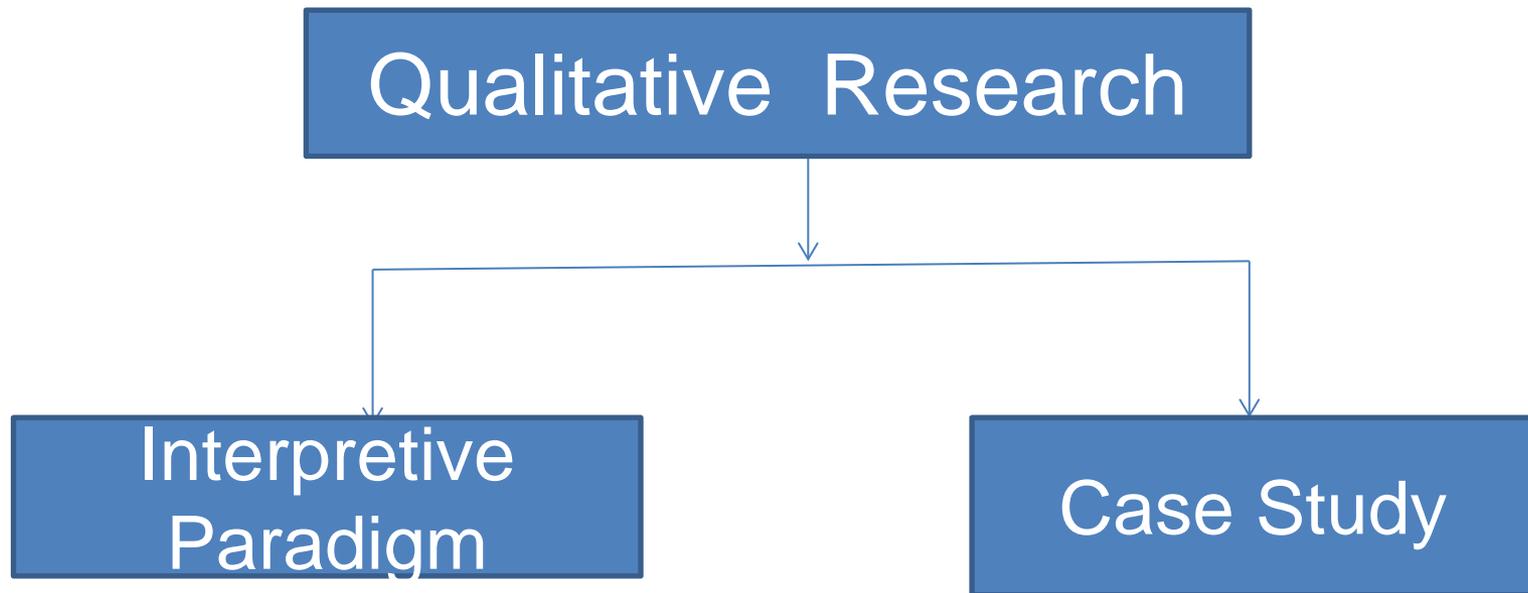
OBJECTIVES

1. To determine pre-service science teachers' views about teaching Environmental Education in the Natural Sciences classroom.
2. To explore the challenges experienced by pre-service science teachers when they learn to teach Environmental Education.
3. To explore how pre-service science teachers address these challenges and what enables them teach EE.

QUESTIONS TO BE ASKED

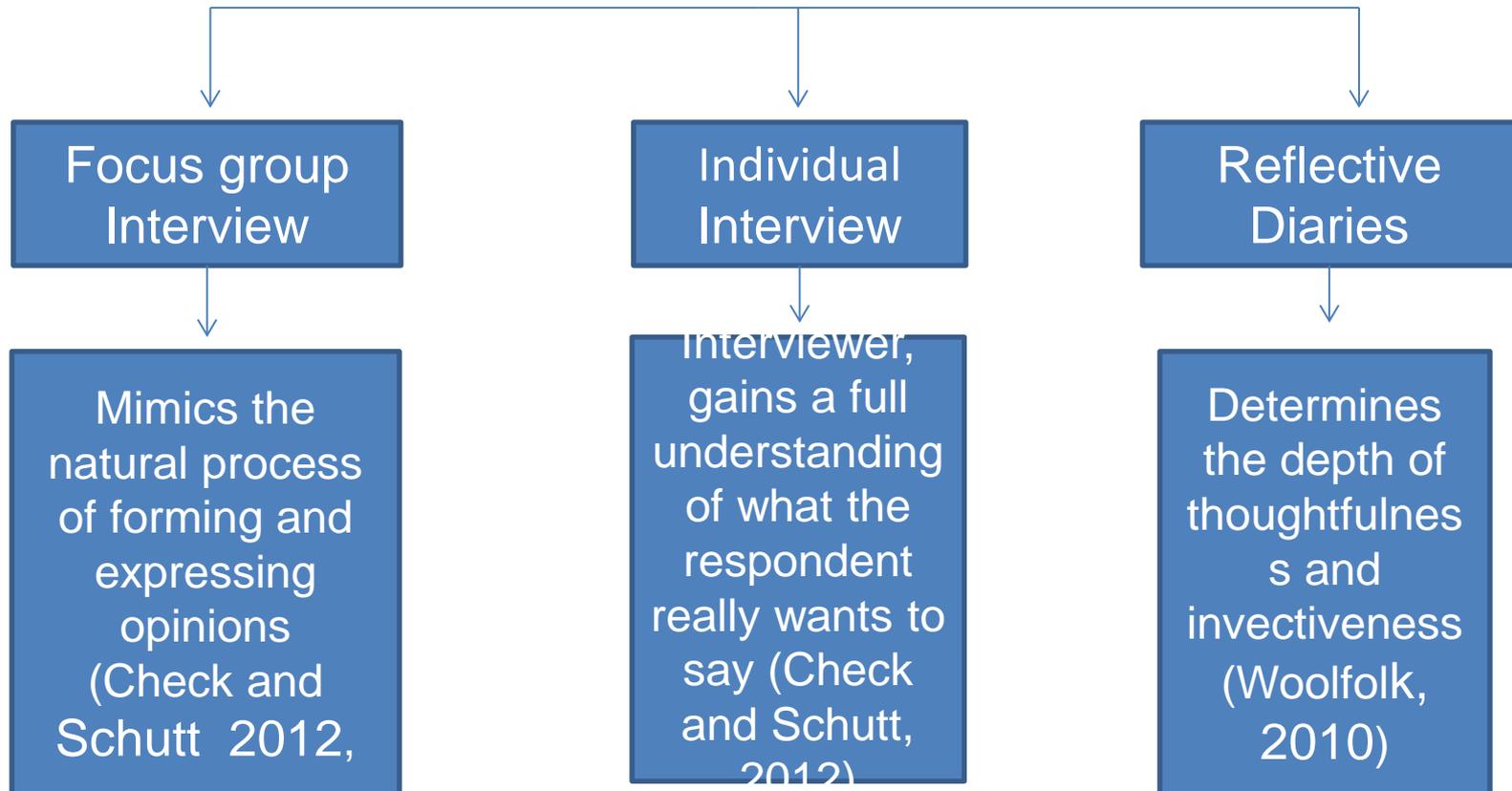
1. What are pre-service science teachers' views about teaching Environmental Education in the Natural Sciences classroom?
2. What are the challenges experienced by pre-service science teachers when they learn to teach Environmental Education?
3. How do pre-service science teachers address these challenges and what enables them teach EE?

RESEARCH METHOD/APPROACH TO STUDY



RESEARCH METHOD/APPROACH TO STUDY (CONTD)

Methods of Data Collection



Research plan

Questions answered	Participant(s)	Instrument/method
1. What are pre-service science teachers' views about teaching Environmental Education in the Natural Sciences classroom?	<p>Twenty five participants presented lessons in groups of fives.</p> <p>Five groups of pre-service teachers (approximately 5 members in each group). Total of 25 volunteers were purposively selected because they were students who studied Natural Science Method 2</p>	Maintained reflective diaries
2. What are the challenges experienced by pre-service science teachers when they learn to teach Environmental Education?	The five groups purposively selected from the 5 groups based on their presentations	Focus group interviews
3. How do pre-service science teachers address these challenges and what enables them teach EE?	Seven individuals purposively selected (based on their insight into learning to teach EE)	Individual face-to-face semi-structured interviews

VALIDITY, RELIABILITY AND RIGOUR

- Multiple methods of data collection namely focus group interviews, semi-structured individual interviews and reflective diaries were used.
- Triangulation is the use of different data collection methods in order to make data trustworthy, Maree (2007), Cohen et al. (2011), Merriam (2009) and Rule and John (2011).
- Data were transcribed and participants would be visited since.
- Cohen et al. (2011) and Merriam (2009) refer to revisits of participants as 'member checks'. These will make the participants verify and agree that they accept as a true reflection of what had been said and what had happened.

LIMITATIONS

- The case study generated in-depth information, and the findings are not intended to be generalized to other populations.
- The study was conducted in only one university and the findings will be relevant and limited to that context.

ETHICAL ISSUES

- Permission was obtained from the Dean and the Cluster Leader
- Informed consent was sought from participants who were above 18 years of age.
- Anonymity of the place of study and participants was guaranteed
- Research data will be stored and disposed after a period of 5 years through shredding and incineration processes.

FINDINGS

Research question one : *What are pre-service science teachers' views about teaching Environmental Education in the Natural Sciences classroom?* Three themes emerged:

- **Theme one:** Human beings depend on the environment for their survival.
- **Theme two:** Human beings need to care for and conserve the environment in order to mitigate the negative effects of environmental crises and also transform the attitudes towards the environment.
- **Theme three:** Numerous environmental crises plague the global society.

FINDINGS (CONTD)

Research question 2: *What are the challenges which pre-service science teachers experience when they learn to teach Environmental Education?*

Four themes emerged:

Theme one: Integrating IKS in learning to teach EE in Natural Sciences

Theme two: Designing practical work on EE and lack of resources

Theme three: Lack of adequate foundational EE knowledge due to limited exposure to EE of pre-service science teachers when in primary and secondary schools.

Theme four: Inability of pre-service science teachers to experience learning to teach EE during Work Integrated Learning, WIL (Teaching Practice).

FINDINGS (CONTD)

Research question 3: *How do pre-service science teachers address these challenges and what enables them teach EE?*

Five themes arose:

Theme one: Collaborative learning with peers

Theme two: Independent research; the use of digital technology (internet), and different human and material resources.

Theme three: Improvisation, resourcefulness and creativity

Theme four: Going on field trips and engaging in outdoor activities related to EE.

Theme five: The use of CAPS curriculum and its implementation as it relates to EE in Natural Sciences.

RECOMMENDATIONS

Recommendations that evolved from insights from this research will be directed towards teacher education institutions, curriculum designers and university educators.

QUESTIONS?

THANK YOU!