

Capturing the Complex Nature of Learning to Teach in the Outdoors: A Case Study

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This paper introduces a research methodology designed to capture the complexities of learning to teach outdoor education. Theories ranging from teacher education, adventure education and experiential education have guided the development of the study. The purpose of this paper is to explain a research methodology which has been applied to an outdoor setting. The paper begins with a brief overview of the context of outdoor teacher education in Australia and provides a description of the research methods used within the case study. The paper highlights the need for further research on preservice outdoor teacher pedagogical practices in order to support their professional growth.

Capturing the complexities associated with learning to teach outdoor education is no easy task. This paper explores a research method designed to support the growth of quality research in outdoor teacher education programs. First the background context of outdoor teacher education in Australia is explored. The preparation of teachers in higher education has been evolving in Australia over the past 100 years. For specialist outdoor teachers however, the history is much shorter. In the late 1990's teacher education programs at Universities across Australia developed specialised outdoor teacher programs. Since the inception of outdoor teacher education programs, we have seen limited research conducted on the teaching/ learning taking place in these programs. This is at the same time when teacher education programs need to accurately capture the quality of pre-service teacher's pedagogy practices to meet Australian education policy requirements (Australian Council of Deans of Education, 1998; Nuttall, Murray, Seddon and Mitchell, 2006; Stronge & Hindman, 2003).

The research design was constructed with reference to the academic literature from teacher education, adventure education, outdoor education, physical education and experiential education. The design followed a group of preservice outdoor teacher educators' through a unit of work which covered learning to teach in the outdoors. The unit of work was taught using an experiential learning cycle designed originally by Kolb (1984, as cited in Prouty, Panicucci and Collinson, 2007) based from experiential education theory that was influenced by Dewey (1938). Through the use of the learning cycle, participants were introduced to key pedagogy concepts from the 'productive pedagogy' manual (Gore, Griffith and Ladwig, 2001). The learning cycle allows for outdoor teachers to teach and learn theory that underpins it at the same time, this is important according to the findings from Edwards & Protheroe (2003) study. At the beginning of the unit of work participants of the study had limited teaching experience. Teaching in a classroom is a complex balance in particular, Darling-Hammond (2006) stated that "adaptive teaching...requires deep and sophisticated knowledge about learning, learners and content" (p.77). When compounded with teaching in an outside setting with added external distractions, safety issues and more, the majority of participants found that teaching in the outdoors was demanding (Philpott, 2005).

Research title: Pedagogy Practices of Preservice Outdoor Education Teachers

Research Question: What are preservice outdoor teachers learning about their pedagogy practices while participating in experiential based unit of work?

Methodology

This Case Study design was influenced by researchers such as Burns (2000), Gay (1996), Lankshear and Knobel (2004), Rogoff (2003) and Yin (2003) that enabled the researcher to choose methods that would capture the complexity

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of teaching outdoors. Furthermore, the complexity of the phenomenon required the development of a robust, strong, reliable and valid methodology best suited to addressing the research question. Other researchers to influence the design include; Borrie and Birzell (2001), Fler (2006), Gale (2006), Luke, Lingard, Ladwig Gore, Mills, & Hayes (2001), Priest and Gass (1997, 2005), Queensland Department of Education (2001) and Tschannen-Moran & Woolfolk Hoy (2001a). The following sections include: research design; participants; assessment instruments; data collection; control of error; confidentiality and potential risks; data analyses and, finally, a summary.

Research Design

A single-case study design (see Figure 1) with embedded units of analysis was used to investigate the impact of an experiential unit of work on the pedagogy practices of preservice outdoor teachers. With the intention to explore how the unit of work impacted on pedagogical skill and knowledge development of preservice outdoor education teachers and also gain valuable new insight of how they develop their pedagogy practices (Bailey, 1991, Luke, *et al.*, 2001).

The researchers utilized a non-experimental descriptive (qualitative) approach to select participants as espoused by Burns (2000). It was important to select participants who had developed some understanding of teaching terms and some experience teaching in the outdoor setting but who were also about to learn new theories and practices about teaching in the outdoors. When recording the participant's data, great care was taken by the researchers to make sure the subjective understandings of the participants were not manipulated in any way (Bailey, 1991; Gay, 1996; Yin, 2003).

A case study design can provide valuable insight to teachers and lecturers in their practice (Yin, 2003). This case study sought to provide an insight of how preservice outdoor teachers developed their understanding of pedagogy practices and implemented their skills through a unique experiential experience, using the experiential learning cycle as a guide, to explore their unique emic perspectives. Due to the inherent difficulties of capturing a thorough account of the participant's experience, a multiple source approach for capturing the experience was needed (Darling-Hammond, 2003; Yin, 2003). The use of the case study approach enabled the researchers to look at the experience and collect data from different angles and as stated by Bailey (1991) that "data for a case study can be gathered in various ways" (p. 63). Yin (2003), like Bailey (1991), argues that case study research gains strength in rigour through the use of multiple sources of data to inform the case. As Darling-Hammond (2003) noted that recent research studies of teachers' learning suggest the use of different pedagogies. In particular pedagogies such as; close analyses of learning and teaching, performance assessments and portfolios helped the novice teacher connect theory to practice (Darling-Hammond, 2003).

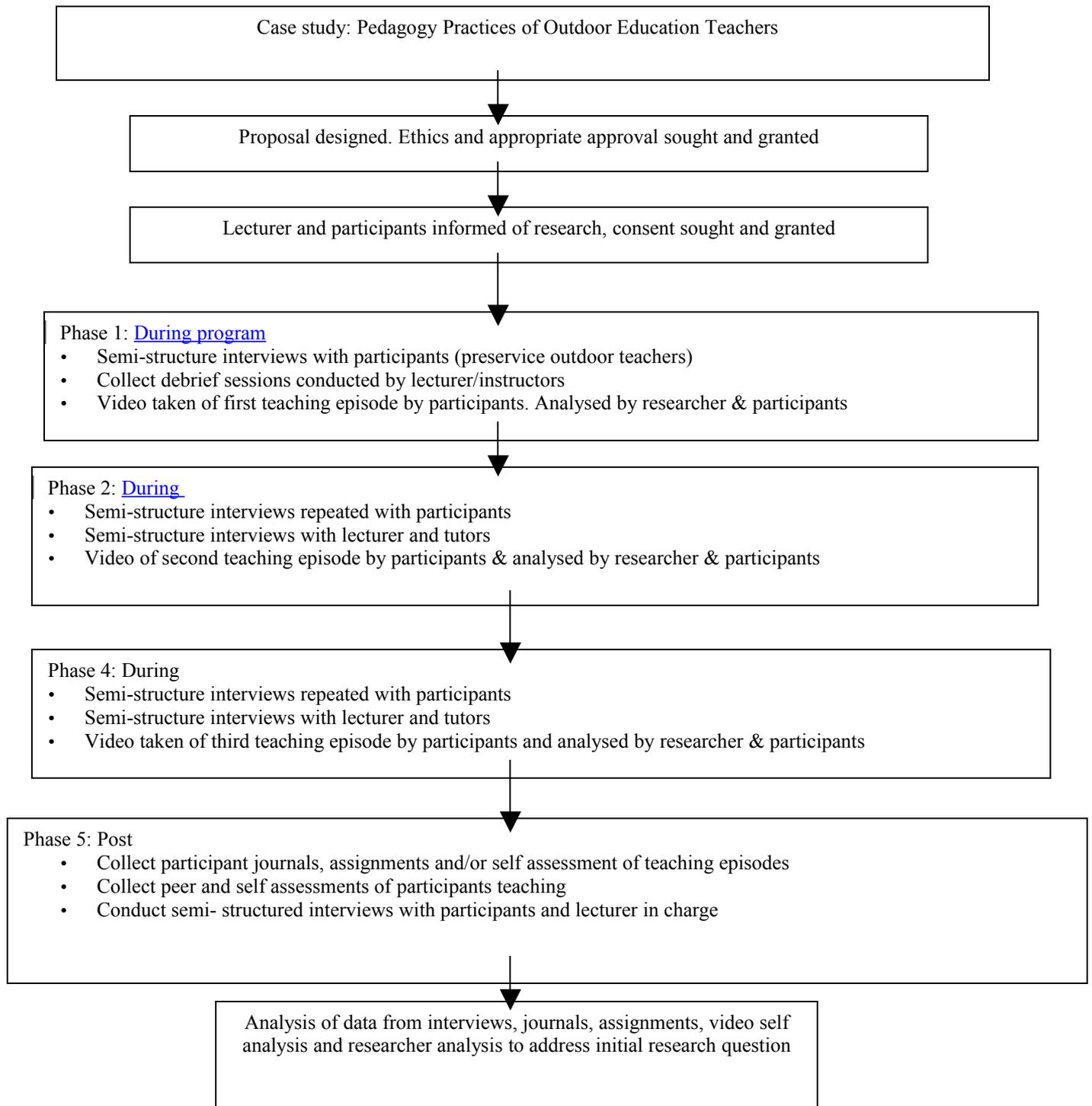


Figure 1. Diagrammatic representation of the research design used in this investigation

The research design enabled the researchers to use a formative evaluation approach to capture how the experiential unit of work impacted on the development of pedagogy practices of preservice outdoor teachers. The use of the experiential learning cycle (see Figure 2), as with other education learning theories, is a complex phenomenon to capture (Kolb, 1984 as cited in Prouty, *et al.*, 2007). Patton (1997) claims that the key purpose of a formative evaluation of this type is to improve a programme, in this case formative evaluation was used to discover the impact of a unit of work on the pedagogy practices of preservice outdoor teachers to be identified "...rather than rendering definitive judgment about effectiveness" (1997, p. 67).

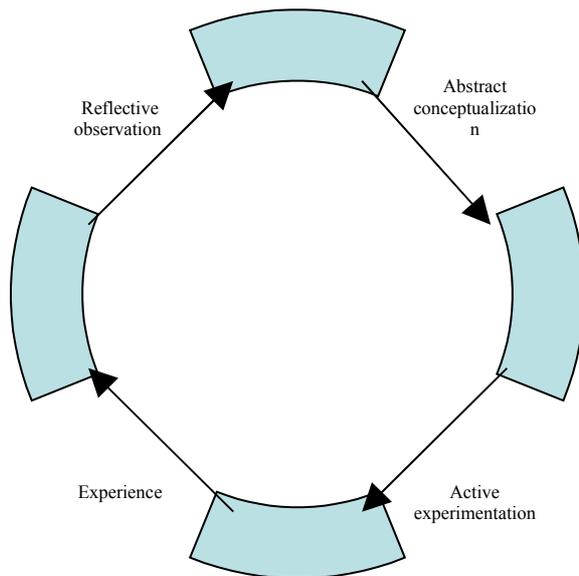


Figure 2. David Kolb's experiential learning cycle (as cited in Prouty, *et. al*, 2007, p.37).

In addition, this research design was influenced by past and current researchers in the outdoor education, experiential education and wilderness education areas (Kolb, 1984; Priest & Gass, 1997, 2005; Prouty, *et al.*, 2007). Due to the nature of the experiential unit of work used in this study that aimed to expose preservice outdoor teachers to teaching in an outdoor setting. Teaching in the outdoors is believed to have its own complex influences on learning therefore a qualitative method was utilized. Furthermore, this approach was successfully utilized by Yin (2003) who recommended using a mixed qualitative approach for data collection when using the case study design. Borrie and Birzell (2001) also support a mixed qualitative approach because it matches the complex nature of the phenomenon researched, the wilderness experience is a multifaceted phenomenon and a single method was not expected to adequately serve the needs of a researcher (or 'the researched').

This case study involved the use of five qualitative data collection instruments (as depicted in Table 1) over a six month period during 2007, it incorporated the suggested mixed data approach (Gall, Borg & Borg, 1996; Yin, 2003). In particular Yin (2003) suggested a design to make the qualitative approach more robust, more specifically the development and administration of 1) semi-structured interviews with participants, 2) observation through video analysis of teaching episodes by

participants and the researchers, 3) collection of participants journals and assignments, 4) peer assessments of participants teaching episodes and 5) lecturer and tutor feedback about the program as shown in Table 1.

Table 1. Sources of evidence: strengths and weaknesses

Qualitative Sources	Strengths	Weaknesses
Semi-structured interview	<ul style="list-style-type: none"> Directly ask questions related to participants experience when teaching Able to adjust questions before each phase to incorporate any new findings from previous participant data Participants candid relationship with researchers 	<ul style="list-style-type: none"> Bias to participants who can think quickly about their teaching performance and new teaching theory Bias due to poorly informed participants Reflexivity- participant may give an answer they perceive is better than what actually happened or what they were thinking
Observation : Video analysis	Participant <ul style="list-style-type: none"> Insightful- view of participants thoughts about their teaching episodes Stable-can review over and over Addresses recall problems 	Participant <ul style="list-style-type: none"> Perception of their teaching skill may be bias Misunderstand the criteria when assessing their teaching performance Reflexivity- participants may act differently when being video taped
	Researchers <ul style="list-style-type: none"> Insightful- view of researchers thoughts of teaching episodes Stable-can review over and over Addresses recall problems 	Researchers <ul style="list-style-type: none"> Time-consuming Costly
Journals and assessment items	<ul style="list-style-type: none"> Insightful-capturing participants thoughts about their teaching as the unit of work progresses Unobtrusive Broad coverage of unit of work 	<ul style="list-style-type: none"> Written with positive bias may not wish disclose negative thoughts or experiences
Peer feedback	<ul style="list-style-type: none"> Encourages participants to think about teaching practices Provides feedback to participant 	<ul style="list-style-type: none"> Peer may not have an understanding of teaching practices
Lecturer and tutor assessment and feedback	<ul style="list-style-type: none"> Provides another professional, experienced and informed view of participants teaching practices Knows the course and assessment criteria in depth. 	<ul style="list-style-type: none"> Bias – wishing participants to perform well which might seem to reflect on lecturer Time consuming Bias – participants may provide assessment work with answers that are favourable to lecturer's bias's

Participants

Selection of the participants and their lecturer

Selection of the participants and their lecturer was undertaken using a purposive or opportunity sampling technique (Burns, 2000; Gay, 1996). A number of criteria were used for the selection of a University to participate in the case study, namely, that an *experiential unit of work in teacher education* was offered and had a large number of preservice outdoor teachers involved. University course outlines were investigated and the 3rd year level programme at University A (coded name) was selected to approach. The use of this sample technique is suitable for this exploratory study (Burns, 2000, p.93).

The participants of the study comprised of 10 male and 14 female preservice outdoor teachers. This robust sample allowed all participants (regardless of their appreciation for teaching) to convey their thoughts and overall sense of their teaching confidence. Throughout the qualitative data collection stages the participants were invited to provide video analysis of their teaching, journal and assignments, peer assessments and participate in one-on-one semi structure interviews with the researcher. The study also involved gathering oral feedback from the lecturer (female) in charge of the participants and two tutors (one male and one female), aged between 35 to 45 years. They participated in the semi-structured interview process and informal discussion.

Assessment Instruments

As shown in Table 1, five types of research instruments were used to gather data for the case study. Namely semi-structured interview schedule with participants and lecturer/tutors, participant-observation through video analysis of their own teaching using the *Productive Pedagogy – classroom reflection sheet* and *scoring manual*, journal and assessment items marked according to grading rubric.

1. Semi-structured interview schedule

The researcher chose semi-structured interviews because, as stated by Burns (2000, p. 425), “it facilitates access to events and activities that cannot be directly observed by the researcher”, in this case capturing the participants thoughts about their own teaching. The semi-structured interview questions were age appropriate and derived from experiential learning cycle themes. An open-ended interviewing technique was used to incite answers from the participants (20 - 24 years old). Experiential learning cycle themes also formed the basis for the open-ended semi-structured interview questions for the lecturer and tutors (Priest & Gass, 1997, 2005). The interviews were conducted on a face-to-face basis with the same questions given to each participant in the same order (see Figure 3). Furthermore, participants, lecturer and tutors were invited to elaborate on emerging themes or any of their views. In design terms, the interviews were based on descriptive, contrast, and structural questions formed from experiential learning theory. Figure 3 outlines Kolb’s (1984) modified model of the experiential learning cycle with the preservice outdoor teacher interview questions added.

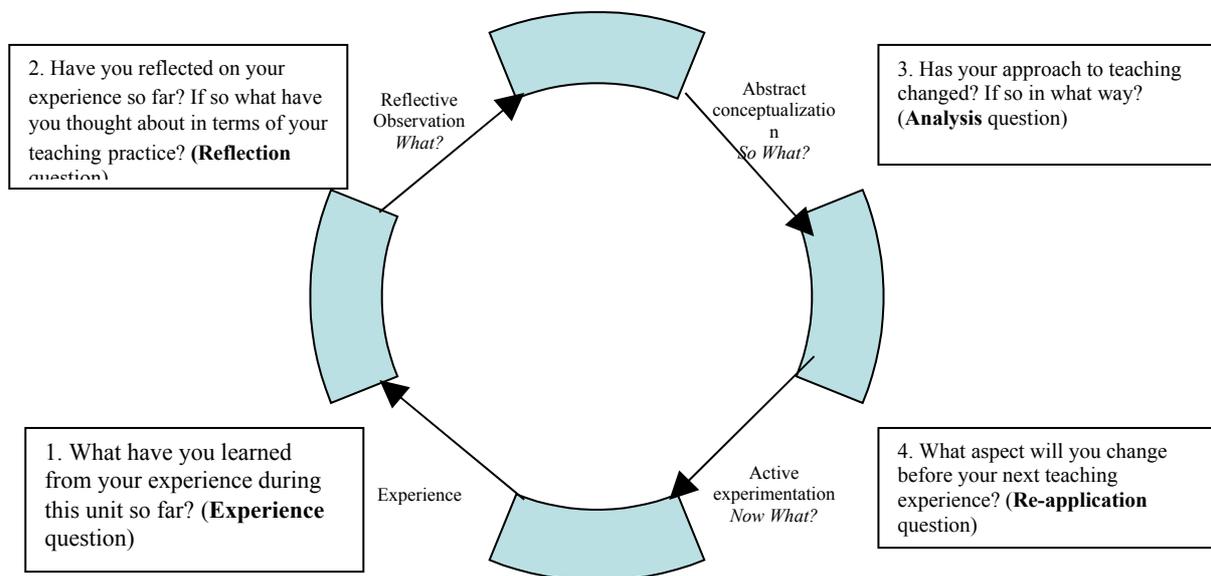


Figure 3. Kolb’s experiential learning cycle (as cited in Prouty, et. al, 2007, p.37) with participant interview questions added.

Additional to the four questions stated above in Figure 3, participants were also asked the following questions: 5. Were there any incidental factors (positive or negative) that could have influenced your teaching performance? 6. Rate your teaching ability at present (very weak) 1–7 (very strong) and 7. How important is developing your teaching skills to you at the moment? (Not important) 1–7 (very important) The experiential learning cycle has four stages that include; 1) concrete experience (teaching episode), 2) observation and reflection, 3) formation of abstract concept and 4)

generalization and testing implication of new situation. As shown in Figure 3, participants were asked to answer a question relating to each of the four stages (Kolb, 1984).

The interview also started with descriptive type questions because, “usually descriptive (questions), requesting informants to describe experiences...is useful at the start of an interview as general non-threatening questions. They allow the respondent to control the flow of information” (Burns, 2000, p. 427). This interviewing technique is akin to the *funnel questioning technique* used by facilitators and teachers in the outdoors (Priest & Gass, 1997, 2005; Kolb, 1984, as cited in Prouty, *et al.*, 2007). Descriptive questions were used because it required participants to observe their own teaching practice and reflect on it and then report that to the researchers through the interview process. As the interviews progressed, the questions moved toward either a contrasting or structural one, these were better suited to gathering information about ideas participants formed. In particular the researchers wished to capture participant’s original ideas about their teaching and how they tried to implement new ideas when going through the different phases of the experiential unit of work.

Three contrast questions were used in the design of the semi-structured interview as well because they, as Burns (2000) claimed, “focused on emotional responses” (p. 427). The researchers tried to encourage the interviewees to share their interpretations of their emotions or feelings towards (in this instance) their teaching episodes. Such a purpose meant the technique was very appropriate for this research. Also, Burns (2000) indicated, “The structural question is used to discover how a person organises their information/experiences” which held the prospect of demonstrating interviewee knowledge of their teaching episodes and, therefore, was deemed highly appropriate for this research (p. 427). Information provided by the interviewees after the first phase of interviews ultimately led to the formulation of additional questions for phase two, three and four. This process allowed the researchers some investigative flexibility to explore new areas and develop an understanding of relevant issues to participants as they underwent their experiential unit of work.

The last question on the interview schedule was designed to allow for further comment from the participants on a particular issue that was unique to their situation. The interview questions were developed with the main research question and current information from productive pedagogy teacher resource material and articles, teacher education theory, experiential learning theory and the review of literature in mind.

2. Video Analysis of teaching episodes

The researchers chose to video record participants teaching episodes because it would capture the whole teaching episode for closer observation and analysis, it also allowed the researchers to have a number of participants provide evidence. Also, the video recording and analysis of teaching technique had been used successfully in other teacher education studies (Fleer, 2006). In this study, the observation was captured on video that allowed both participants and the researchers to analyse all teaching episodes carefully with the ability to rewind. All 24 participants were asked to watch each of their videos and simultaneously conduct a self analysis with the aid of the *Productive Pedagogy - classroom reflection sheet* devised by Gore, *et al.*, (2001) and provide a commentary of their thoughts about each teaching episode. All information was recorded in an electronic format and collected by the researchers at the end of the experiential unit of work.

3. Grading and analysis of journal and assessment item

The reflective journal, refer to Table 2, derived by the lecturer-in-charge of the experiential unit of work who based the criteria on the unit of works objectives in particular the four dimensions of productive pedagogy. The lecturer and tutors provided notes of their assessment of the participants teaching performance at each of the phases based on the *Productive Pedagogy – classroom reflection sheet*.

Table 2. Reflective journal requirements

Assessment Criteria:	Reflective Journal
Productive Pedagogies – Classroom Reflection Rubric. You will be introduced to this rubric during the	<p>Part A: (500 words) Summarise either the Sullivan (2006) or Wolfe & Samdahl (2005) article and critically discuss their main argument in relation to your understanding of risk and risk management.</p> <p>Part B: Reflective Journal (about 1500 words) Answer the following questions. Draw on appropriate literature to support your observations and reflections.</p>

<p>unit and will use it to analyse your teaching experiences from the ropes course.</p>	<ol style="list-style-type: none"> 1. What new skills or knowledge did you learn from the experiential programme? 2. How did the unit differ from other units taken for pedagogy development? 3. How did you change because of your participation in the experiential programme? 4. How did the ropes course phase's impact on the experiential programme compared with the lecture/tutorial classroom setting? 5. Do you think the facilitation skills or knowledge learnt during the theory phases were directly transferable to a teaching situation in the outdoors? 6. What tasks if any do you think had the most impact on your development of pedagogical skills?
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4. Lecturer and tutor feedback and assessment of participant progress

Lecturers and tutors were informally interviewed and provided their assessment notes of each participant in the unit of work. This information was triangulated with the researcher's assessment of participant practices throughout the unit of work. This source provided both formative and summative data of participant's progression through the unit of work and final overall level of teaching knowledge and skill acquisition.

5. Peer feedback

Participants were involved in two types of peer feedback activities. First method of feedback was guided by questions about teaching practices provided by the lecturer. The second method was conducted through group discussions and debriefs. Refer to Table 3 for an example of a peer feedback and self analyses sheet used by participants. This feedback sheet was devised and distributed by the lecturer in charge of the unit.

Data Collection

Data can be collected from a number of sources. The researchers implemented five from the six important sources recommended by Yin (2003). Furthermore, Yin (2003) stated that "the most important advantage presented by using multiple sources of evidence is the development of converging lines of inquiry, a process of triangulation..." (p. 98). This is important to the researchers because the aim of the study was to capture a rich and deep understanding of a complex teaching situation. The five qualitative data sources included: interview, observation, participant journals and assessment items, lecturer and tutor feedback and notes (including a unit outline), peer assessment of teaching practices.

Table 3: Artefact of peer feedback and self analyses of teaching episodes

Criterion	HD	D	C	P	N
Understanding experiential learning in a ropes course context (4%)	Consistently takes account of complex context and selects appropriate activities and sequences	Takes some account of context and selects some appropriate activities and sequences	Recognises defined context and uses standard activities and sequence	Context acknowledged but not really taken into account when planning activities or sequence.	Context not recognised as relevant and unable to identify appropriate activities or sequence
Understanding safety management in a ropes course context (4%)	Consistently able to identify safety management issues, and strategies required to apply these and link these to teaching and learning objectives	Demonstrates an understanding of safety management principles and able to apply a comprehensive plan to manage activities safely	Able to apply safety management models to develop plans for safe teaching	Able to use safety management models but only takes the context into account in a very limited way in application	Limited understanding of safety management principles and unable to apply safety management models effectively
Interactive and group skills (including, contribution, teamwork and negotiation skills) (7%)	Can interact effectively within a professional group. Can recognise or support or be proactive in leadership. Can negotiate and handle conflict.	Can interact effectively within a learning group, giving and receiving information and ideas and modifying responses where appropriate.	Meets obligations to others (peers); can offer and/or support initiatives; can recognise and assess alternative options.	Makes efforts to develop interactive skills. Uses basic interactive skills appropriately.	Has problems working with others/avoids work with others. Does not contribute or contributes inappropriately in groups.

Your name:

Signature _____

Name of group member:

Grade: _____

Peer – Assessment Grid for unit – Teaching sessions. Each person will score themselves and each member of the team on this rubric. Final scores will be averaged across the whole teaching group

In 2006, the semi-structured interview schedules were piloted on a small group of preservice outdoor teachers not participating in the study. The lecturer and tutors interview questions were tested on the researcher's supervisor before being conducted in the real situation. All unclear questions were reworded and presented back to the piloted participants before the schedules were subsequently used. Conducting a pilot study process by, for example, asking a small group of pilot participants and the researcher's supervisor to check the questions helped to eliminate errors (Cozby, 1997). This process was used successfully by one of the researchers (Philpott, 2005) in a previous study to control question error or misinterpretation. Furthermore, research by Cozby (1997) indicated that the use of a pilot study allowed the experimenter to become familiar with their role and to regulate their procedures which helped eliminate researcher error.

The researchers interviewed the participants to obtain their thoughts on teaching development and also interviewed the respective lecturer and tutors involved in the delivery of the experiential unit of work to obtain their thoughts on the participant's development of teaching practices. Three different angles for triangulation of data sources were obtained, 1) from the participant, 2) from the lecturer and tutors and 3) from the researchers. To add more reliability to the interview process, the researchers conducted the interviews and maintained the same questioning techniques throughout the interview data collection phase. The interviews ranged from ten to fifteen minutes depending on the brevity of the interviewees' responses. The interviews were tape-recorded, transcribed, coded for key words, and comments were assigned in terms of specific components of the study (Burns, 2000). Refer to Figure 4, triangulation of data.

The observation of teaching episodes was captured on video. Observations of the teaching episodes made it possible to record the behaviour of the participants as they taught which strengthened the research design (Burns, 2000, p.411). The video observation technique was used with all of the participants in the study however only 24 participants were randomly selected from the class list to have their video analysed by the researchers for the studies purpose. All participants attended a tutorial in week 3 run by the researchers that focused on operation of the camera and the techniques involved in capturing their comments and analysis in electronic format via "Snapper software". The tutorial also included instructions on using the *productive pedagogy - classroom reflection sheet* and *productive pedagogy scoring manual* (Luke, *et al.*, 2001). Participant questions and clarification were addressed when they were allowed to practice operating the video camera. Direct observation of the teaching episodes were conducted to record anecdotal evidence and to help with any problems with equipment.

During the teaching episodes two participants of the study taught students while one participant video recorded the session. During the three hour teaching episode the three participants rotated from being the camera operator to teaching. This allowed the participants to average 2 hours teaching and 1 hour camera operation time per episode. This recording technique was repeated in phase three and four of the observation data collection schedule. Refer to Table 3 depicting the phases of data collection rotation of roles.

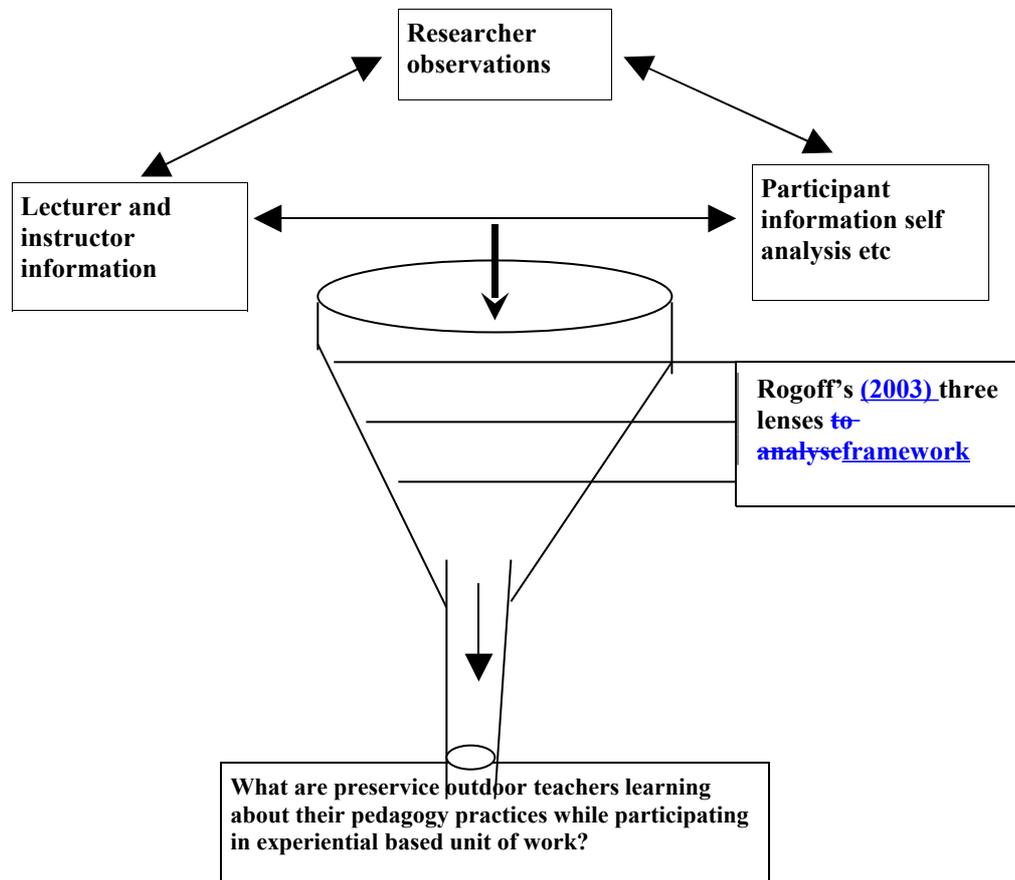


Figure 4: Triangulation and funnelling of the data

Table 3: Phases of data collection

Qualitative Research Pedagogy Themes:	Week 4 Phase 1	Week 7 Phase 2	Week 13 Phase 3	Week 14
1. Intellectual quality		observations (VIDEO) self assessment	observations (VIDEO) self assessment	Collect journal reflections and other forms of artifacts
2. Significance of learning (relevance)				
3. Quality learning environment	1 on 1 interviews pre-service outdoor education teachers	1 on 1 interviews with pre-service outdoor education teachers	Reflection: Peer assessment and Self assessment	1 on 1 interviews with pre-service outdoor education teachers
4. Recognition of difference.				
(Gore, et al., 2001)	1 on 1 Interview Lecturer and instructors		1 on 1 Interview Lecturer and instructors	1 on 1 Interview Lecturer and instructors

The collection of artefacts that participants were required to complete for the unit of work and documentation of the experiential unit of work also provided other avenues of evidence. In particular the participant's journal and assessment items were evidence required by the lecturer to pass the experiential unit of work. All 24 participants provided an ungraded electronic copy of their journal and assessment item to the researchers at the end of the unit of work. The journal required participants to address five key questions devised by the lecturer and it also contained the running commentary of the participant's progress throughout the unit of work. Also participants provided any other assessment item completed during the experiential unit of work via electronic format to the researchers in week 13. The

researchers analysed the journal and assessment items with the aid of the same assessment rubric participants and the lectured used from the unit of work. The analysis by the researchers was completed independent of the lecturers grading comments. After the researchers conducted the initial analysis of participants work the lecturer's grades and notes were compared with the researchers' findings and moderated.

Analysis of the qualitative data involved entering: interview data, electronic copies of participant's journals and assessment items, lecturer and tutor assessment notes, peer assessment and video observation analysis using 'Snapper' software (2006) from participants and the researchers, into NVivo 7 (2006) program. This process allowed the researchers to organise the data using identified themes and also become immersed in the evidence. The researcher's supervisor also checked the transcriptions and data analysis, which added to the study's sturdiness.

Control of error

A number of control factors were considered when the researchers designed the study. Firstly, the multiple methods of data collection were designed to collect data through written and verbal format to allow all participants of the study the opportunity to provide information about their experience as accurately and clearly as possible. Each phase of data collection helped to control errors in different ways throughout the study, for example the semi-structured interview schedules helped to control errors, misunderstanding, and enhance reliability. Refer to Table 1 for strengths and weaknesses of each qualitative source used in this study. Furthermore, the semi-structured interviews are advantageous as Burns (2000) suggests:

The informant's perspective is provided rather than the perspective of the researcher being imposed; the informant uses language natural to them rather than trying to understand and fit into the concepts of the study; the informant has equal status to the researcher in the dialogue rather than being a guinea pig (p. 425).

Nonetheless, semi-structured interviews have disadvantages, such as issues of disparity between interviewees, which can lead to difficulties in assessing and response coding (Burns, 2000). Burns (2000) stated that:

A major disadvantage is that the researcher is open to the vagaries of the informant's interpretation and presentation of reality. This is a problem of validity, but, of course, if the informant genuinely perceives events in the way stated, then their behaviour follows as a corollary (p. 426).

The semi-structure interview schedule in this study sought to offset this problem to some extent by carefully crafting questions to keep the interviewer and interviewee on topic. This method of data collection favours the participant who likes to verbalise their response.

The observation technique in this study required the use of a video camera to capture the participants teaching episodes. The researchers were at the data collection points as non-participant observers which allowed the researchers to blend into the background without the participants becoming self-conscious. The way the video observation task was set up allowed the focus to be diverted to as many as six groups operating their cameras and conducting their teaching episodes at once so the researchers were able to move from one group to the next with little effect on the participant's performance. The researchers were also able to observe up to three groups at one time or observe some without being noticed due to being outdoors in a tree setting. Interactions with the participants were minimised but when they did happen the researchers assumed a role that would elicit cooperation, trust, openness and acceptance (Burns, 2000).

The video data also allowed the participant time to use a more complex process of analysis through the use of *productive pedagogy – classroom reflection sheet*. The use of the video analysis as an observation tool allowed the researchers to address two purposes. Firstly, the participant's recall of their teaching episodes was enhanced because they could watch themselves over and over to pick out their teaching capability and demonstrate their level of understanding of their pedagogy practice. The second use of the video was to compare the researcher's analysis with the participant's to identify any discrepancies in the participants self analysis of their pedagogy practices using the *productive pedagogy – classroom reflection sheet*.

The use of the participants' electronic journal and assessment items were to further investigate the thoughts of the participants over a longer period of time. Allowing the participant's time to think and reflect over their pedagogy practice development, unlike the interviews which require the participants to think more quickly due to the verbal nature of the information gathering technique. The participant had more time to collect their thoughts and ideas during the write up of their journal and assessment item and where able to refer to resources to help explain their thoughts. This method of data collection favours the participant who likes time to experience, reflect, and write.

Neither the researchers nor this study was substantially disadvantaged by the lack of a "real" context because the research directly applies to the current situation in outdoor teacher training. The researchers have conducted and observed many types of Outdoor Education experiences in Australia and Internationally. Strength of the study came

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from the researchers applied knowledge of the experiential unit of work and having co-lectured the experiential unit of work on two previous occasions (2005-2006). The researchers have a deep understanding of the experiential unit of work's intended outcomes for the participants.

This research technique uncovered issues from participants who had disparate experiences and capabilities. Having anticipated that participants' backgrounds varied markedly, the researchers used that information when shaping the interview questions for phase two and three of the process. In terms of data entry, each participant was coded so that all their data from each quantitative source could be entered together as an embedded unit of data.

Data Analysis

The transformative practices framework successfully designed and used by Rogoff (2003) was used to guide analysis of the data. The three lenses Rogoff developed such as personal, interpersonal and environment are excellent layers that helped draw out each participants experience and also allowed the research to look at the whole group and the environments effects. The environment or the setting is an important factor because it allows the researcher to analysis whether the environment had any implications to the research, this also means that Rogoff's framework was more appropriate than a Vygotsky. The framework was the guide to breaking down the qualitative data further by using the process of unitising, which involved the extraction of a word, sentence, paragraph or concept from each unit of information (Yin, 2003). This technique enabled the entire text from an interview to be divided by, for example, the themes from each dimension that emerged from the raw data. In other words, the individual transcripts from each interview and video observation along with the journal and assessment items were cut into separate nodes electronically using NVivo 7 software (2006), enabling those specific responses to be used in a variety of ways without becoming totally divorced from or untraceable to the original source. In fact the multi-perspective analysis enabled changes to themes and codes as a deeper understanding of the data emerged (Burns, 2000). It is also important to note that only substantial differences between score sets can be considered meaningful because the study used non strict statistical criteria.

Summary

This single-case study with multiple embedded units of analysis employed a non-experimental research design due to the purposively selected participants (Bailey, 1991; Gay, 1996; Yin, 2003). According to Yin (2003) "the single case can be used to determine whether a theory's propositions are correct or whether some alternative set of explanations might be more relevant" (p.40). Therefore, the data had to be appropriately analysed without manipulation, using descriptive techniques. Five qualitative data sources were used because of the complex nature of the outdoor teaching environment. The case study design for the research was very effective in meeting the needs of the research (and researchers). We researchers wish to highlight the need for further research on preservice outdoor teacher pedagogy practices in order to support quality outdoor teacher growth.

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