Engagement, self-efficacy and intention to teach Environmental Education in two pre-service primary teachers

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Abstract

With specific reference to two final year student primary teachers, this paper explores three elements identified by Van Petegem et al. (2005) as useful constructs in the analysis of pre-service teacher education in environmental education. Engagement, intention and self-efficacy as identified by Van Petegem et al. (2005) are shown to be fostered in particular ways by a pre-service teacher unit designed to encourage implementation of environmental education. In particular, the two students remarked on the influence of new content knowledge and of pedagogical knowledge as building upon their own affinity with environment, and with their views of teaching as being important in shaping their efforts towards educating for a more sustainable future.

At an international level there is agreement that environmental education[21] (EE) should be developed in order to contribute to the conservation of nature and to the concomitant societal change towards more sustainable ways of living (UNESCO 2003). Associated with this is recognition that if EE is to become more prominent in school education, then it must also be a part of pre-service and in-service teacher education (Tilbury 1992; UNESCO 2005; Shallcross 2008). Although interest in this field is growing, there is limited provision of EE in teacher education (Tilbury, Coleman & Garlick 2005; Beckford 2008) and limited discussion of the manner in which EE in teacher education might best proceed (Scott 1996; Varga et al. 2007).

A number of models describing EE in teacher education have been proposed (Ferreira, Ryan & Tilbury 2006).These describe broad scale organisation, as well as some elements of important content in teacher preparation in EE. Additionally, a frame of reference for teacher preparation courses has been provided by Van Petegem et al. (2005) wherein a set of criteria for implementation of EE in initial teacher education is described. Three criteria from Van Petegem's frame of reference will be applied in this paper to structure a profile of two pre-service teachers in relation to EE.

Several criteria are included in Van Petegem et al.'s (2005) frame of reference for Environmental Education Implementation (EEI). The frame of reference was developed in acknowledgement of the fact that a rational cognitive model of change (setting goals, writing and implementing plans, evaluating actions) does not necessarily achieve desired social change. The involvement and motivation of key players to participate in innovation need to be considered as these are elements in the change process (Hargreaves 1998) and therefore the EEI criteria for pre-service teacher training include the affective domain. The criteria for EE implementation in teacher education are participant engagement, instructor credibility, participant intention, functionality of the overall organisation of the EE component within teacher education, participant self-efficacy, institutional climate and processes of evaluation (Van Petegem et al. 2005). Whilst Van Petegem et al developed their framework with reference to tertiary teachers and tertiary organisation, for the purposes of this paper, *student* teacher engagement, intention and self-efficacy are investigated. This is in recognition that the students in

[21] Whilst the debate concerning the terminology of EE and EfS is acknowledged the general term EE will be used. This decision has been made because EE is the term used by Van Petegem et al (2005) in their description of the Environmental Education Implementation frame of reference which has been adopted in this paper. Nonetheless the interpretation of EE adopted by the authors is consistent with contemporary definitions of EfS such as that espoused in the Australian National Environmental Education statement (Australian Department of Environment and Heritage, 2005).

question are at the point of becoming teachers, and that affective qualities may well influence their contribution to EE in schools.

Participant engagement, intention and self-efficacy

Engagement refers to the involvement and motivation of participating individuals to include EE in their work. As an example, Hart (2003) reported, with reference to practising teachers in Canadian primary schools, that there were many who believed the environment was an important part of their teaching and many that voiced a commitment to 'saving the earth for future generations' (Hart 2003:191). Furthermore many of the teachers whom Hart (2003) reported, attributed their valuing of nature and the environment to childhood experiences out-of-doors. Whilst there must be many reasons for individual engagement with EE, the notion of significant life experiences in nature as having a lasting influence on the environmental concern of those involved in activities such as environmental education has been described (Chawla 1998; Palmer et al. 1999; Bogeholz 2006) and contested (Gough 1999).

Intention to act, as a statement of personal goals, is recognised as a key indicator of individual commitment to include EE in educational objectives (Van Petegem et al. 2005). Many studies attempting to delineate factors that influence environmental behaviours (in this case including environmental work in one's teaching), show that factors such as knowledge or espoused pro-environment attitudes are not of themselves good predictors of behaviour (Kollmuss & Agyeman 2002). It has been suggested that intention to act is a less problematic indicator of behaviour than other variables (Kaiser, Wolfing & Fuhrer 1999).

Teachers' *confidence* has been shown to influence their willingness to engage with particular teaching practices (Bandura 1997). Bandura (1997:3) referred to confidence as perceived self-efficacy and defined perceived self-efficacy as "beliefs in one's capabilities to organise and execute the courses of action required to produce given attainments". Self-efficacy beliefs are considered to influence the thought patterns and emotions that enable effort in pursuit of goals, such that a person with a high sense of self-efficacy will apply more effort to attaining goals. One's sense of self-efficacy could also be affected by the level of availability of resources, and other potential constraints in a teaching situation. It is therefore of interest to gain some indication of the perceived confidence levels of pre-service teachers in regards to EE. One of the difficulties of measuring self-efficacy is that a sense of self-efficacy is connected to specific tasks, subjects and contexts (Tschannen-Moran & Hoy 2001).

There appear to be few studies that report on beliefs of pre-service teachers in relation to EE. Moseley, Reinke and Bookout (2003) used an environmental education efficacy belief instrument to investigate the effect on self-efficacy of pre-service teachers (belief that they could teach environmental education effectively) following a one-day training session, activity planning, and activity presentation course. Environmental education in this instance appeared to be interpreted as outdoor education. Their measure showed no lasting increase in environmental self-efficacy. This is consistent with the view that belief change in adulthood is a "relatively rare phenomenon" (Pajares 1992:325), meaning that beliefs are thought to be formed early in life and are resistant to change. Nonetheless for teacher educators the concept of self-efficacy is important. According to Hoy (2000), a high sense of efficacy in beginning teachers is associated with positive outlook and achievement in teaching.

Background to the study

At an Australian regional university, EE has been offered as a compulsory final year unit of study for pre-service primary teachers. Whilst delivered by the science education team in the university, the unit promoted an interdisciplinary approach to EE, and utilised particular teaching strategies such as experiential and co-operative learning, values analysis, futures visioning and practical consideration of individual and collective impact on environment.

Questions guiding this study

The purpose of the study reported here is to investigate and describe the nature of engagement, intention and self-efficacy of two final year pre-service primary teachers enrolled in the semester-long (13 week) EE unit. Three questions guide the report:

What indications are there of engagement with EE for each student? What contributes to this engagement?

What indications are there of intention of each student to include EE in future teaching? What contributes to this intention?

What indications are there of self-efficacy with regard to EE? What contributes to this?

Methods

Interviews were held at the completion of the semester-long unit. The interview responses examined for this preliminary paper were from two out-of-38 students who volunteered to participate, from an overall cohort of 107. One interviewee was male and the other female. Both were between 20 and 25 years of age. Interviews of each individual were voice-recorded and were of approximately 45 minutes duration. Full transcripts were made. Interview data was triangulated with information from a survey that was completed by the entire cohort at around the same time. Many of the survey questions were adapted from a survey extensively used in the Asia-Pacific (Yencken, Fien & Sykes 2000). Relevant questions from the survey were posed in a Likert-type scale (Table 1).

Table 1: Survey items relevant to engagement, self-efficacy and intention of student teachers to include EE in future teaching.

Survey item					
Rate your desire to include EE in your teaching.	Very strong	Strong	Medium	Weak	Very weak
How confident are you about including EE in your teaching?	Very confident	Confident	Medium	Not very Confident	Not confident at all
How often would you as a teacher like to include an environmental focus in your classes?	Never	Several times a year	At least once a month	At least once a week	
Teachers can play an important role in solving environmental problems through teaching	Strongly agree	Agree	Disagree	Strongly disagree	

The qualitative analytical mode of analysis suggested by Strauss and Corbin (1998) was used to identify emerging themes in interview data. Themes were coded and conceptual links made to the constructs of interest, in this instance for engagement, intention and confidence in relation to EE.

Findings and discussion

What indications are there of engagement with EE for each student? What contributes to this engagement?

A fundamental premise underlying EE is that human actions of the present will impact on our shared future. Jeremy indicated his engagement with EE by making the point quite strongly that he is interested in how particular actions will influence the future and how there are options in decision making that have future consequences at varying scales. In this sense it appears that he is motivated to engage with EE in teaching by the realisation that his teaching in the present can be influential on the future. Jeremy's explanations are consistent with his survey response which shows that his motivation to include EE was "very strong" and his reason was "for the future". This response is reminiscent of the findings of Hart (2003) who found that concern for future generations was a fundamental reason why many experienced teachers engaged in EE. Additionally for Jeremy, gaining a more thorough understanding of the impact of human activity on the environment was fundamental to his engagement with EE, as were experiencing the potential of studies *in* the local environment and knowing how he could incorporate EE into his teaching:

> *Jeremy:* In the course [the EE unit] you find out about the details of what the issue actually involves. Why it's happening and then how you can do something and how you can put it into the classroom as well.
>
> I didn't have a very thorough understanding of any of the issues. And actually knowing more about something, knowing the details not just about the issue but about how it will affect the future … learning about how to change your behaviour, or how people can change and what will happen if they do. And that will motivate me to want to teach it especially when [the actions] are do-able or strategic.
>
> *Int:* So contributing to motivation then is finding out the detail of issues?
>
> *Jeremy:* Yeah, but also we have experienced it as well. Getting out, that was a good way to motivate, to influence my motivation to do it. Like seeing the eco-house the other day, going up into the woodland and seeing the different types of environments that way. Experiencing things has been good.

When asked why he felt motivated to include environmental education, he acknowledged his early life in a country town in NSW where:

> *Jeremy:* It's a very clean environment and unpolluted ... My family's quite good like with recycling, and everyone does in Mountaintop, and we have a worm farm and whatever else … We're lucky because of the good rainfall patterns and to have good land, but it also shows you what could be lost quite easily.

Jeremy appreciated what this physical and social environment had to offer and recognised its fragility. Also influential in motivating Jeremy were experiences in science classes at school:

> *Jeremy:* We had a creek down the back of our school and I remember doing, in about Year 10 water samples and things like that and that really taught me about water quality and the life within the water and the things that use it as a resource.

Sue too, acknowledged the influence of earlier experiences, in particular, of traveling and the environmental outlook of her father on her motivation to engage with EE. For both, this is consistent with the findings of Palmer et al. (1999) and Bogelhoz (2006). Bogelholz (2006) for example, in her review of empirical contributions to the field cited studies about duration and type of nature experiences and how these influenced environmental action and interest in preservation.

Whilst Sue also attributed her engagement with EE to her own fascination with the new information that she had gained from the university unit, her main concern was with the future:

> *Sue:* I'm finding my biggest motivation. I feel like it's our responsibility to teach younger people for the future. I mean education for sustainability is good in that way because we're looking at how we should be sustaining the earth.

It was evident that concern for the future was an important issue to Sue:

> Some of my friends in third year clearly don't have the understanding and they're just like, "Oh no, whatever," and they're not worried about recycling, they're not worried about spending 20minutes in the shower, but I am.

For both students, gaining an understanding of environmental matters, thinking about the purpose of environmental teaching, and learning about strategies they could use in the classroom were influential on their engagement with EE. Each of these points, is recognised as an element of pedagogical content knowledge, and an important component in professional education for teachers (Grossman 1990).

When asked what might diminish their engagement, both students referred to evidence of a lack of EE in existing practice. This was based on what they had observed in schools.

> *Jeremy:* I realise that a lot of teachers are using pre-made programs and it's [EE] not really in it much.

But for Sue, of even greater significance was the anticipated outlook of future colleagues. In response to the request, "tell me what diminishes your motivation to teach EE", she replied: "I find not a lot of people are interested".

Despite their strong concern for the environment, as indicated in their interview and survey responses, and also through the social actions each had performed during the EE unit, both Jeremy and Sue recognised that the practices and attitudes of others could compromise what they were able to accomplish in schools.

What indications are there of intention of each student to include EE in future teaching? What contributes to this intention?

Much research in EE has attempted to identify factors that bring about or that can be used as predictors of pro-environmental behaviour (Kollmuss & Agyeman 2002). Whilst other researchers do not adopt this seemingly instrumentalist view (Fien 1993; Robottom & Hart 1993), van Petegem et al (2005) considered intention to act as an important component of the frame of reference for EEI. The students in this study directly expressed their intentions for future teaching. Jeremy for example expressed intention to include EE in his teaching with reference to a science unit about plants which he had taught during practicum:

> *Jeremy:* I think if I get into a school I will be doing it [EE] and teaching science units. But I do think also, it's [EE] a bit more of a practical and relevant thing to be teaching, like teaching them how plants grow is all good but it's more of a relevant thing to them in their world that they know how their behaviour is having an effect on plants.

A question that specifically probed the influence of the EE unit ("So if you had not done 412 [the university EE unit] would you have done environmental teaching once you were in school?") gave some indication of how Jeremy's intention was influenced:

> *Jeremy:* I don't know. I don't think I probably would've. Like in the back of my mind I would be aware of it but I don't think I also had the knowledge of the need for it to be taught or that it should also be addressed in the curriculum.

Jeremy's remark suggests that particular aspects of the EE unit (work showing how EE is embedded in school policies and syllabus, and information about environmental issues) raised his awareness of EE sufficiently for him to consider including it in his teaching. This interpretation corresponds with his selection in the survey of the highest category for desired frequency of including an environmental focus in his teaching. Importantly, his comments also suggest that without specific attention to EE in pre-service work he would not have considered doing it. This statement lends weight to Van Petegem et al's notion that *intention* to teach EE is something that could be

influenced and that should be considered in development of teacher education courses. In the example provided here, of a primary teacher education unit, the fact that student attention is drawn to EE as part of mandatory policy for teachers in the state, and as something that is of significance for the future has contributed to this student's intention to include EE in his work.

For Sue, her developing personal interest in the environment, the information that she was learning and her understanding of the significance of this information fueled her intentions:

> *Sue:* I'm finding that through this unit I understand more about the problems. Sure I knew there was global warming. I knew there were drought issues. I didn't understand the extent, how important they are to everything, like the ecological systems to everything. But yeah, now I understand more so I want to do more.

Supporting the notion of positive intent, survey results show that both Jeremy and Sue strongly believed that as teachers they had an important role to play in solving environmental problems.

What indications are there of self-efficacy with regard to EE? What contributes to this?

Given that positive self efficacy in beginning teachers is associated with positive outlook and achievement in teaching (Hoy 2000), self confidence of participants and what contributed to this in relation to EE was of interest. Jeremy was able to comment on experience that contributed to his confidence:

> *Jeremy:* Like I was aware of environmental problems, like a shallow understanding of it, whereas now I have a much deeper understanding and I guess that would give me confidence I think, in any subject area. If you have more knowledge you're going to have a bit more confidence as a teacher. Same with all the resources that you've used and the different strategies that you've used to do it.

Jeremy is indicating that his confidence to engage with EE has been augmented by specific parts of the teaching intervention, in particular content knowledge, knowledge of resources and teaching strategies. His remarks also appear to be consistent with the notion that a sense of self-efficacy can be specific to particular skills and subjects (Tschannen-Moran & Hoy 2001). Jeremy's ranking of "confident" in the survey suggests he has some reservations about his abilities but he attributes the confidence he does have to "knowledge of resources and strategies".

Similarly, both interview and survey data indicated that Sue felt confident to undertake EE on the basis of strategies and resources with which she had become familiar. For both students, however, a high level of confidence did not apply to all of the aspects of EE that had been presented in the unit. Consistent with the findings of others (Lane et al. 1995; Tschannen-Moran & Hoy 2001), both could identify specific topics and strategies with which they did not feel confident and Sue was able to anticipate that her overall confidence would be diminished in a school where the Principal and Head Teachers were disinterested in EE.

Summary

Van Petegem et al (2005) suggested a framework which they applied as a method of analysis of processes of change towards the improved representation of EE in teacher education. Three elements that Van Petegem et al. considered to be important have been explored in this study, within the context of final year pre-service primary teacher education. It has been found that both students interviewed experienced a degree of engagement with EE that they could attribute to specific experiences in their earlier lives, to their concern for the future and also to particular aspects of their recent learning at university. They both remarked that increases in knowledge about environmental matters, direct experience of the environment and also knowledge of teaching strategies in EE added to their engagement with the topic.

Their intentions to include EE in their work were positive. As with engagement, their intentions were influenced by concerns for the future, and a realisation that as teachers

they had an important role to play in solving environmental problems. Optimism from such a finding must be tempered by Wang et al.'s (2008) remark that surveying and interviewing beginning teachers (and of course students) about their feelings does not capture what beginning teachers are actually able to do in their classrooms. In recognition of this potential disparity between intention and performance, Jeremy, Sue and others will participate during their beginning teacher year, in a study of their teaching practice and how their practice relates to their pre-service education.

Self-efficacy was fostered by knowledge of content, teaching strategies and resources for the classroom. As mentioned, these are elements of pedagogical content knowledge said to have an important role in shaping the quality of teaching (Wang, Odell & Schwille 2008). Whilst both students expressed positive self-confidence in aspects of EE, and the importance of this is acknowledged, others have shown that *beginning teacher* experiences can lead to a diminished sense of self-efficacy (Woolfolk Hoy 2000).

Conclusions

It is recognized that EE is not well represented in teacher education and that this is one of the reasons why it is overlooked in school classrooms. Future research is needed to focus on the essential components of teacher preparation for EE and how EE can be organised as a part of teacher education courses. In an attempt to understand the outlook of some recipients of EE in teacher education, this preliminary paper explores the views of two students in relation to three affective elements from Van Petegem et al's (2005) framework. Undoubtedly, the views of other teacher students would be quite different from those reported here. As such, the paper provides no generalisable statements beyond recognition that for these two students, engagement, intention and self-efficacy in EE could be described as positive, and that their positive outlook, whilst appearing to originate in earlier experiences could be fostered and developed during teacher preparation.

The implications of this exploratory analysis are that the framework suggested by Van Petegem et al (2005) provided a useful tool to assist in gaining an understanding of teacher preparation in EE. More specifically, the study acknowledges the importance of early experiences in generating positive feelings towards the environment and this has implications for the manner in which EE is delivered to children. Additionally there is the finding that student teachers are encouraged to engage with EE, in a situation where EE is legitimised, through an explicit EE presence in teacher education. This implies that the presentation of EE in teacher education in a manner that contributes to student teacher engagement, intention and self-efficacy in EE will assist in meeting this identified need in teacher preparation.

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