

An Action Research to Facilitate Science Teacher Educator in Infusing Environment Education Themes

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Abstract

This paper reports the findings of a study that has attempted to find out the perceptions and classroom teaching practices of Science teacher educator about environmental education (EE) infusion. The study also looked at the process of environmental infusion in Science and associated challenges emerging from it. The research was designed in a qualitative paradigm, within this paradigm, action research model proposed by Retallick (2003) was used. The purposive sampling strategy was used to select research participant. The research participant of this study was a Science teacher educator. Semi-structured interviews, classroom observation were major data collection tools. Thematic approach was used to analyze the data. The findings of the study have been based on pre-intervention, intervention and post-intervention stage. The major findings revealed that at pre-intervention stage, Science teacher educator's understanding about environmental education was limited. This takes into account only knowledge dimension of environmental issues. Other aspects for discussing environmental issues such as skill development, attitude formation and taking informed action for the solution of environmental problems were missing from his teaching. The research study enabled research participant to develop his capacity in delivering EE concepts confidently. However, environmental infusion was challenging for Science teacher educator because of the nature and complexity of environmental issues. For discussing environmental issues, sound knowledge base is very essential. In the light of the findings, some recommendations for Science teacher educators, curriculum developers and textbook writers have been made.

Keywords: Environmental Education, Infusion, Teacher educator, Science

Introduction

The state of the environment is mostly talked about phenomenon around the world. Environmental issues have greatly affected global environment in recent years.

Environmental issues such as depletion of ozone layer, loss of world habitat, deforestation, desertification, water pollution, soil pollution and air pollution have captured the attention of the entire world. The existing situation calls for immediate attention at policy level. One of the reasons of environmental degradation is human being life style. This life style is not only contributing towards environmental pollution but it is also consuming huge natural resources of the world. The question comes to mind “How can this life styles turn into environmental-friendly?” The answer is embedded in education. Education is the only key agent for bringing change in the life styles of people. The education helps to take informed decisions about the environment. Environmental education (EE) is an emerging field in the world. One of the purposes of environmental education is to develop knowledge, skills and attitude towards understanding environmental problems and undertake responsible behavior for its solution. There is wide spread recognition about EE in the world. The UN Conference on Environment and Development was a landmark in the history of World. This Conference was held in 1992 in Rio de Janeiro. The other milestone was “The World Summit on Sustainable Development”. This summit was held in 2002 in Johannesburg South Africa. This summit confirms Agenda 21. The Agenda 21 says that “education is a critical for promoting Sustainable Development and improving capacity of the people to address sustainable issues.”(UNESCO-UNEP, 1994).

Pakistan is a signatory of all international conventions and protocols on environment. The National Conservation Strategy, which was published in 1992, was a policy documents on environmental improvement and Sustainable Development. The Government of Pakistan also has taken several steps to promote environmental education concepts in formal education system. For this purpose present textbooks were analyzed to see opportunities for integration of environmental themes into it. It is regretted to say that very little work is done to promote environmental concepts in teacher education programs. There is great need to work on both pre-service and in-service programs. Infusing environmental themes into pre-service and in-service teacher education programs is gaining acceptance day by day.

The present study is an attempt to build the capacity of Science teacher educator in EE infusion. The study also attempted to explore the possibilities for environmental infusion in Science teacher education program.

The following research questions guided the study:

1. What are the perceptions and classrooms teaching practices of Science teacher educator about EE and its infusion?
2. How, as a researcher, I can facilitate environmental infusion in Science?
3. What kind of challenges Science teacher educator faces during the process of environmental infusion?

Literature Review

There are different interpretations of the term “Environmental education”. No single definition can explain the holistic nature of the concept. Here are given few definitions of the term.

According to Centre for Environmental Education (CEE) India (1997):

Environmental education is a process aimed at promoting a population that is cognizant of and concerned about, the total environment and its related problems, and which has the knowledge, attitude, commitment and skills to work individually and collectively towards the solution of current problems and prevention of new one. (p.1)

Environmental education (EE) has different connotations in different contexts. Meadows (1990) looks at the definition of EE from different point of view. He terms it as a learning experience. This experience helps to appreciate, understand, and maintain environmental

systems into its totality. According to him, EE is to take the responsibility of environment for making it better.

Kwan and Stimpson (2003) point out that environmental education is a worldwide concern about environment. This concern has been evolved in social, economic and ecological perspective of the environment. The idea of EE has based on ideas from a variety of UNESCO conferences which have been held from time to time since last 30 years. Each perspective has its own focus and repercussions because of differences in environmental, educational, historical systems in which these perspectives nurture.

The need for EE has been discussed in many national and international protocols. EE has potential to change life styles of the people. According to Scott, Gough, Teamy, Dillion & Hindson(1999) EE can be used as a tool for educational improvement. The approaches of EE are collaborative which has power to engage people in community dialogue.

There is need to infuse EE concepts not only in school curricula but also in teacher education programs. Environmental infusion can be done in different subjects and at every grade level. By infusion approach, we can bring EE concepts without comprising the objectives of delivering existing content. This can be a pragmatic approach. Through this approach, we find room for EE concepts in already overburdened curriculum. The infusion of EE themes into teachers' education programs is becoming popular day by day.

The training of teacher educators in EE is critical in reorienting teacher education to respond to sustainable development. Building capacity among teacher educators should help them, in the spirit of situated learning (UNESCO, 2005).

According to Ravindranath (2007) "An initial step in sensitizing teacher education is to introduce EE into teacher education and make teacher educators more responsive to sustainable development, to national and international perspectives on environment and development and above all to the critical role of EE and its contribution to sustainable development"(p.199).

Methodology

The present research has adopted qualitative approach. Within qualitative design, action research has been used for facilitating Science teacher educator in environmental infusion. In this study, the action research model mentioned by Retallick (2003) was employed. The components of this model include:

- To make plan of action(Based on existing situation of the phenomenon)
- To implement plan
- To observe and reflect on the effects of action

In my action research, the first step was to know what was happening and why it was happening. This refers as pre-intervention stage. At this stage, the perception and teaching styles of research participant about environmental education were known through semi-structured interviews and classroom observation. The next steps were implementation and reflection (Intervention and post intervention stages). At this stage, the researcher facilitated research participants in different aspects of environmental education. This facilitation includes co-plan the lesson, sharing material, and discussing infusion framework, observing the lesson, pre and post conferences.

The Research Participant and Researcher's Role

In this study, the researcher's role was to facilitate Science teacher educator in infusing environmental education themes. I helped out my research participant in environmental

infusion. Mr. Ali (Pseudonym name) was my research participant. Mr. Ali was an assistant professor in Government Elementary College of Education Karachi. The principal of the college rated him as one of the talented and experienced Science teacher educator. At the time of data collection, Mr. Ali was engaged in primary schools teachers training in science. Mr. Ali was a certified master trainers in Science from Department of Education and Literacy. He has obtained master degree in Science and Education. His total experience as a Science teacher educator was 15 years. Although Mr. Ali has attended numerous training programs in different areas of teacher education yet he has not attended any training program in EE.

Sampling and Sampling Procedure

The purposive sampling design was used in the study. The criteria for the selection of research participant has outlined as under:

- The research participant should be a teacher educator from Government Elementary college of Education.
- The teacher educator should be willing to work with the researcher.
- The teacher educator should be Science teacher educator.
- The teacher educator be experienced and should have taught both in pre-service and in-service Science Teacher education Programs

Data Collection Phases

Table 1

Phase	Data Collection Strategy	Activity
Pre-Intervention	<ul style="list-style-type: none"> • Discussion with research Participant about the purpose of research • Classroom Observation • Semi structured Interview of teacher educator 	<ul style="list-style-type: none"> • Analysis of Science Teachers Training Manual for exploring the opportunities of EE infusion • Understanding teacher educators concepts about EE • Maintaining Reflective Diary
Intervention	<ul style="list-style-type: none"> • Classroom Observation • Pre and post conference with research participant 	<ul style="list-style-type: none"> • Co-plan the lesson • Sharing material with research participant • Taking field notes
Post Intervention	<ul style="list-style-type: none"> • Classroom Observation • Informal Discussion 	<ul style="list-style-type: none"> • Teachers views about new EE approaches • Reflection of research participant on Environmental infusion

Data Analysis

Thematic approach was used to analyze the verbal data. Following steps were taken for data analysis:

- Maintaining and arranging field notes

- Typing the field notes
- Separate them according to themes and giving codes
- Highlight the key themes
- Synthesis them for understanding and improvement
- Searching the important patterns
- Meaning Making

Discussion of Findings

In this section, the findings have been discussed according to data collection phases as mentioned in Table 1.

Pre-Intervention Stage

The findings from this stage are based on the research participants' interview and on his classroom lesson observation. The purpose of interview was to elicit the views of research participant about different aspects of EE (Knowledge, Skills, and attitude). Analysis showed that teacher educator's content knowledge in environmental education (EE) was limited to certain concepts of EE and issues. In his interview, Ali said, "Environmental education is the study of nature and to know about the environmental problems is all about EE". (Interview, January 5, 2004).

The term 'infusion' was quite new for Ali; however, the teacher educator used EE concepts in Science to some extent. Ali responded, "I do not know about the process of infusion. I have heard this word first time, even I have attended so many workshops I did not come across this term." (Interview, January 5, 2004).

Although Ali had not heard the term "infusion", he was using EE in his lessons to some extent. In this regard, Ali said, "we are teaching environmental education in chapters like balanced diet, water pollution and noise pollution." (Interview, January 5, 2004).

While observing the lesson, the researcher found that teacher educator did not involve students in any kind of activities. He was continuously discussing knowledge dimension of EE. The other aspects such as skills, attitude and action were missing from his lesson. The lesson observation further indicated that Ali's knowledge was limited to those environmental issues that were mentioned in the Science textbooks and training manual. Data revealed that teacher educator was provided very few opportunities for professional development in environmental education.

Intervention Stage

After analyzing the Science teachers training manual for the purpose of exploring opportunities for environmental infusion and by knowing Ali's views about EE and having observed his classroom practices, the next step was to identify areas for environmental infusion. During this stage, the researcher build the capacity of Ali in EE infusion and facilitated him in conducting lessons for environmental infusion. The analysis indicated that teaching material such as articles on EE helped Ali in discussion of EE concepts and related issues in the classroom. According to Ali, "It was first time in my career that I taught Science in this way, I have no previous experience in environmental infusion. In the beginning, I was scared but teaching material was so nice that it encouraged me to engaged teachers in activities. At this stage, the researcher helped me a lot. For me it was a good lesson." (Field notes, Classroom Observation, February 10, 2004).

Analysis showed that discussing environmental issues in the class were challenging for Ali. It was difficult to handle and sum up discussion, because environmental issues are interrelated. In a post conference, Ali realized that , “ During discussion, I did not imagine that environmental issues are so stimulating that they demand our full attention, and I also realized that there is no single answer of environmental issues”(Field notes, Classroom Observation, February 10, 2004).

There is no doubt that environmental issues are complex, interrelated, having no single solution. The solution is based on local environmental conditions and demands. As Sherma & Merle(1990) pointed out that the main goal of EE is to help out learners and equip them with set of skills that contribute towards the solution of environmental issues. For this purpose building the capacity of people in understanding and discussing environmental issues is very important.

Generally, environmental issues are discussed in a broad framework. This framework includes Knowledge- Skill- Attitude-Action-Participation. Data confirmed that Ali faced difficulties while discussing and engaging teachers in environmental infusion at action and participation level of EE. Ali admitted that “it was difficult for me to link lesson activities with all aspects of environmental education. It was really challenging to create ownership among teachers about environmental issues” (Field notes, Classroom Observation, February 18, 2004).

Post-Intervention Stage

In intervention stage, the Ali’s capacity to deliver environment content within specified environmental framework has improved. This gave him confidence at post-intervention stage. At this stage, his views on EE became mature. Analysis of interview and teaching showed that Ali’s subject matter knowledge and teaching skills has enhancedme delivering environmental content. It shifted from knowledge aspect to other aspects of EE. Ali said:

“Environmental education is not a name of subject but it is a thinking process. It is not just to give knowledge but also develop disposition of people to address environmental issues. Environmental education is to create positive attitude among people”. (Interview, March, 2, 2004).

Analysis of data further indicated that Ali’s classroom teaching practices improved during the study. In the beginning, teacher educator was using only lecture method while teaching environmental related **topics**.The researcher facilitated Ali to shift from single teaching approach to variety of approaches. This was only made possible when Ali’s capacity was improved. Researches also confirm that EE requires training. As Tilbury 1992) commented that if anybody requires that teachers can transmit ideas about environmental issues effectively, they have to motivate students in such a way that it make students to think holistically about the environment. Environmental issues cannot be discussed and solved in isolation but require global perspective.

Data also indicated that research participants faced challenges while infusing EE dimensionsinto Science. Hart (2002) elucidated that teachers face pedagogical issues during infusion. This is because of nature of Science curriculum, which is issue-based. At this stage, there is needed to keep in mind the moral and social aspects of environmental issues as well. It was also challenging for Ali to choose and use environmental material properly in such a way that it creates interest and enthusiasm among teachers, the data revealed. In the beginning of the study, the only teaching resource for Ali was Science textbook and manual but when Ali started to design his own lesson plan, he was also using variety of web-based resources. Data further revealed that infusion was not so easy for Ali, he admitted that “In

infusion, teachers need lot of time and energy when you are inserting some concepts in topics.” (Interview, March, 4, 2004). Alvi &Aziz (2000) mention that while infusing teachers have to focus on content. The emphasis should be in such a way that it does not affect the integrity of the course. The research findings showed that Ali found environmental issues interesting and demanding. These issues create sense of ownership among teachers.

Lesson Learnt

As a researcher, it was a great learning experience for me. I have learnt how to convert my theoretical understandings into real process of doing research. I have learnt negotiation skills. As a leading teacher educator, it was my first experience to facilitate Science teacher educator in the pedagogy of teaching environmental education. While working with Ali, I also improved my EE concepts. I learnt the importance of patience in helping out other. During co-planning the lessons, several issues emerged, but all were solved with mutual understanding.

Recommendations

Based on the findings of the study, following suggestions are made for Science teacher educators, curriculum developers and textbooks writers:

There is great need to build the capacity of teachers and teacher educators in environmental education. Science teacher educators should be provided opportunities to attend courses in environmental education not in Pakistan but also in abroad. The college administration should encourage Science teacher educators for environmental infusion not only in Science but also in other subjects. Environmental clubs should be formed at college level, these clubs can celebrate Environmental, Earth and Ozone depletion days.

Environmental education in in-service teacher education is a neglected area in Pakistan. While developing manuals and modules in Science education, teaching resources should be identified and if possible attach in annexure. This material may include lesson plans on EE topics and on- line resources.

Environmental concepts should be incorporated with brief description in Science textbooks of elementary grades. Moreover, these textbooks should be enriched with local examples on environmental issues. Textbooks should be enriched with colourful pictures showing different environmental situations.

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