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LEARNING FOR THE ENVIRONMENT: A TEACHING EXPERIENCE WITH SEMI-SCRIPTED ROLE PLAY

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Abstract

Getting students to act out their roles and to apply appropriate arguments for and against their position as defined by the role is a challenge in approaching and exploring an environmental issue through role-playing. This action research addressed this concern by exploring how a semi-scripted role play could be used to promote active student learning in a Science, Technology and Society (STS) lesson. Using greenhouse effect as an example of environmental issue, this study explored how students playing different characters articulated their response to the semi-scripted role play setting. A group of 26 master students who took Science, Technology and Society (STS) as a core course took part in research and carried out a role play in groups of six for a period of two hours. The multiple data sources for this study consisted of student's written reflections, an informal and unstructured observation, and Role Play Evaluation Form. Overall, the students indicated that the semi-scripted role play helped them understand an environmental issue both from their own and other's perspective. The provision of guiding information via semi-script enabled students to feel empowered to express, share, argue, and negotiate more comfortably and confidently. In addition, students indicated that the role play helped them to develop critical thinking. The role play had helped create an engaging and productive learning experience that educators could use this exercise to lead students in the exploration of broader local environmental issues.
Key words: *action research, environmental issue, semi-scripted role play, Science, Technology and Society.*

Introduction

Environmental challenges and issues such as climate change, air and water pollution, the degradation of biodiversity and increasing garbage are among the main concerns in every part in the world. Environmental education (EE) is one of the tools used to create awareness and generate action regarding these challenges among the people. According to Stapp (1974), environmental education is a means by which educators can assist students to develop a greater understanding on solving problems of their ever-changing world as noted as follows:

> "Environmental Education is aimed at producing a citizenry that is knowledgeable concerning the total environment and its associated problems, aware and skilled in how to become involved in helping to solve these problems, and motivated to work toward their solution" (Stapp, 1974, p. 49)

Hence, through the process of EE, individuals acquire knowledge and skills necessary to form judgements to participate in decision-making and to take appropriate action in solving environmental issues and problems. According to Hungerford & Ramsey (1994, p.16), to develop an effective citizen who are able to contribute to the solution of environmental issues,

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she or he should acquire 1) the ability to analyze issues and correctly identify the individuals or groups involved in issues and their beliefs and values; (2) the ability to investigate issuesin a manner so as to identify the facts surrounding them and their proposed solutions, along with their social, economic, political, legal, and ecological ramifications; (3) the ability to evaluate issuesand to determine the most effective means of resolving them. One of the curriculum approaches of environment education to develop those abilities is education or learning for the environment.

The learning for the environment approach explicitly aims to develop concern and responsibility in students through helping them make decisions about resolving environmental problems and taking appropriate action (Huckle, 1993). Via this approach, students will be able to consider the values and attitudes that underpin people's responses to the environment and, in so doing, clarify their own values (Murdoch, 2007). As such, appropriate teaching approaches need to be chosen to show how those abilities may be practically realised during the investigation of an environmental issue.

Hungerford & Ramsey (1994) suggested the issue investigation skill approach for dealing with environmental issues. The intent of the issue investigation approach is to develop in students the skills involved in issue investigation and resolution so that they can be applied throughout life (Hungerford & Ramsey, 1994). This recommended approach can be met through the use of role play. According to Hungerford & Ramsey (1994), role-play provides students with practice in making important decisions and in developing action-oriented human relations skills. Sogorno (2004) defines role play as:

> A learning activity in which participants act out a set of defined role behaviours or position with a view to acquiring desired experiences. A role-playing scenario could be mimicking, demonstrative or illustrative of specific concepts, problems or situations. (p. 356)

This definition clearly demonstrates that student is presented with a scenario consisting of these elements – role, context, and function or purpose. Sogorno (2004) highlights the purpose of the role player, within the given context, 'is to feel, react and behave as closely as possible to the way someone placed in that particular situation would do'. This process enables students to feel their way into likely reactions of the characters, as they perceive them. Hungerford & Ramsey (1994) note that role-playing permits the learner to get inside the issue as he/she assumes the role of a particular player and interacts with other players in attempting to resolve the issue. The student's power to bring characters to life extends their sympathy and sense of responsibility towards their environment.

According to Errington (1991), the successful execution of a role play is dependent on players' perceptions of how people in specific roles 'do' or 'should' behave within certain social contexts. In other words, role players need to consider the beliefs, attitudes and behaviour of those who hold these roles in real life. This is essential for role players to throw themselves successfully into the role within certain social context. In order for this to occur there has to be a supportive learning environment. As Tolan and Lendrum (1995) have asserted that role play is able to 'stimulate the imagination and enable course members to engage with people's concerns and complexities within a supportive environment'. Students have been reported to find role play exciting and challenging when it is implemented as a teaching strategy (Tolan&Lendrum, 1995). Educators have found role play to be a powerful teaching strategy (van Ments, 1983). In other words, learning activities should be appropriately structured and carried out so that learners gain maximum benefits from a role play.

According to Nestel and Tierney (2007), the four learning environments suggested by Kolb and Fry (1975)'s theory of experiential learning is especially important in the execution

of a successful role play. These include the affective, symbolic, perceptual, and behavioral learning environments. The affective learning environment emphasizes concrete experiences so that students actually experience what it might be like to be an assigned role in a role play. The symbolic learning environment is one in which learners are involved in trying to solve problems for which there is usually a right answer or a best solution. The perceptual environment emphasizes the process of problem solving in which learners are required to approach a problem situation through different perspectives (own opinion, expert opinion and literature) by listening, observing, discussing and personal pondering. Learning processes may include reflective exercises such as keeping journals, writing reflective essays, or engaging in dialogue with other students. Such practices are incorporated into each class session, which emphasizes the importance of reflection on learning. Finally, the behavioral learning environment emphasizes actively applying knowledge or skills to a practical problem. Activities should be structured so that learners gain intrinsic rewards and values. Consequently, educators should consider how to incorporate each learning environment suggested by Kolb and Fry (1975) into a role play.

In Malaysia, EE is taught across the Curriculum and integrated in each subject from Science to Religious Studies in both primary and secondary schools.Malaysian Curriculum for both pre-service and in-service teacher education has made clear the approaches teachers should adopt when realising environmental education across the curriculum (MOE, 2003). Role play has been identified as an important teaching and learning strategy in motivating students to take an active role in exploring EE issues.

Science, Technology and Society (STS) is a core course offered by most master Science Education programme in the Malaysian university. The fundamental aim of Science, Technology and Society (STS) is to equip students to understand and situate scientific and technological developments in their cultural, environmental, economic, political and social contexts (SPPS, 2011). Students are encouraged to engage in issues pertaining to the impact of science and technology on society and the environment and make responsible decisions about how to address such issues. For example, rather than learning about the facts and theories of weather patterns, students can explore them in the context of issues such as global warming.

As an educator in the area of environmental education, STS was always believed to be able to manifest the responsibility in a very practical way – through the activities in which students were engaged in classrooms. Helping students to recognize their dependence on the natural world developed a stronger sense of responsibility towards reducing the environmental problems. One of the central concerns as an educator and researcher was how to engage the students in active learning. The researcher had always felt that a student-centred approach is essential to allow students engage actively in exploring the applied aspects of environmental issues.

It is not always possible to have students investigating environmental issues within direct life situations. For example, students may not have the chance to walk through a rainforest, or to be present at debates on rainforest conservation. In this sense, some environmental issues may only be simulated and investigated from student learning experience in the role play. Via a role play, there is a chance for students to express their personal and shared views regarding a stance on an environmental issue (Errington, 1991).

Considering the benefits of role play in investigating an environmental issue, the researcher decided to use role play in a Science, Technology and Society (STS) lesson. It was thought that this was especially relevant in getting students engaged actively in resolving environmental issues or community problems.

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Background to the Problem

The researcher's first experience with the use of role play took place in a lesson for a group of 26 master students who took Science, Technology and Society (STS) as a core course towards a master degree in Science Education. A whole-class role play was adopted with the hope that students could engage actively to point out their views on resolving an environmental issue. Students were initially placed into groups of between 3 and 4 people. Students were then told that they were representing different groups that had a vested interest in a piece of land on the hillside. Each group had an area of interest identified, within which each group was required to present an argument reflecting its interests and concerns. For example, one group was representing housing developer and its area of interest was opening up the land for building luxurious housing lots. On the other hand, an environmentalist would be more concerned about protecting the land from development. Each group was then to give a press conference, where they were to outline these interests and concerns.

It was found that the students had difficulty to act out their roles and to apply appropriate arguments to support their interest and concern as defined by the role. Students should be able, to some degree, adopt the role of the interest group they represented. They had actually been asked to research the issue from the perspective of their assigned roles a week prior to the role play. The allocated tasks simply did not prepare them for the role play, and so additional time was being used for them to revise their roles prior to the role play. The doubt about the ability of students to perform in the role play led to the following concerns: - How did I facilitate and engage students in their learning via role play? What action did I need to take to help engage students in an active role? What were the students' views towards my actions?

With these questions in mind, the researcher decided to explore another way of role play for students to engage with the environmental issues. It was considered that a smallgroup teaching environment might provide students with better opportunities to engage in active learning. So researcher decided to explore how a semi-scripted role play might be used to support students as they brain-stormed for their view points about environmental issues. The semi-scripted role play is a sequence of instructions of the order of interaction between players, with the occasional line of dialogue to ensure that key statements are made (Milroy, 1982). The literature has highlighted the major strengths of using scripted role play, especially in providing students guiding instructions during the role play (Alden, 1999). This would give the instructor and student security from the fear that the activity would wander from the intended focus. This raised in researcher's mind the issue of how the greenhouse effect would be examined within a small group semi-scripted role play.

Greenhouse effect refers to the observed warming that results when solar radiation is trapped by the atmosphere; caused by atmospheric gases that allow sunshine to pass through but absorb heat that is radiated back from the warmed surface of the earth (Darlene, 2006). Intergovernmental Panel on Climate Change, the leading authority on global climate science, attributes most of this warming to human activities, notably the burning of fossil fuels and the destruction of forests (IPCC, 2001).

The examination of greenhouse effect could engage students to formulate their own opinions from the viewpoint of specific roles related to the global climate. Slight changes to the role play were made by preparing guiding instructions in a semi-script that relate to the role they played. The instructions did not tell students specifically what to say. These instructions only assisted students to prepare to take a particular position from the assigned character's perspective. This was particularly important for students who were not familiar with the assigned character. It also gave security from the fear that the activity would wander from the desired focus of the role play. The hope with this change was that this more "guided" approach in character preparation would further motivate the students to take responsibility for their own learning.

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Accordingly, the purpose of this action researchwas to explore how students playing different characters articulated their response on greenhouse effect to the semi-scripted role play setting. Specifically, the present study set out to answer the following research questions:

What were the student's thought regarding their learning engagement in the semi-scripted role play?

Methodologyof Research

A group of 26 master students (11 males, 15 females) who took Science, Technology and Society (STS) as a core course in Science Educationtook part in this study. The master students were 8 primary and 18 secondary inservice science and mathematics teachers and their age ranged from 28 to 40. The in-service teachershad4-16 years teaching experience, entered the master programme for a two-year period (four semesters).The students who took this subject had all possessed a degree in Science and Education major in Biology, Chemistry, Mathematics and Physics.

The relevant educational literature on the subject (Alden, 1999; RECSAM, 2000) and Kolb and Fry (1975)'s four learning environments were refereed in preparing this semi-scripted role play. This had an impact on the way the role play was conducted. The class was divided into four groups and a chairperson was assigned to lead a 60-minutes role play for the group. The approach for the semi scripted role play was set in four steps as presented in Figure 1. Firstly, students were introduced to the nature of the role play. Students in a group of six were going to take part in a role play between different members of a United Nations committee. There were six players on this committee and each player had specialist knowledge on the greenhouse effect. These players consisted of Earth Science Expert, Expert Chemist, Chief Geologist, Environmental Spokesperson, Economic Spokesperson, and Spokesperson for the car manufacturers. These roles were chosen to illustrate the complexities associated with addressing issues that are scientifically and economically global in scale.

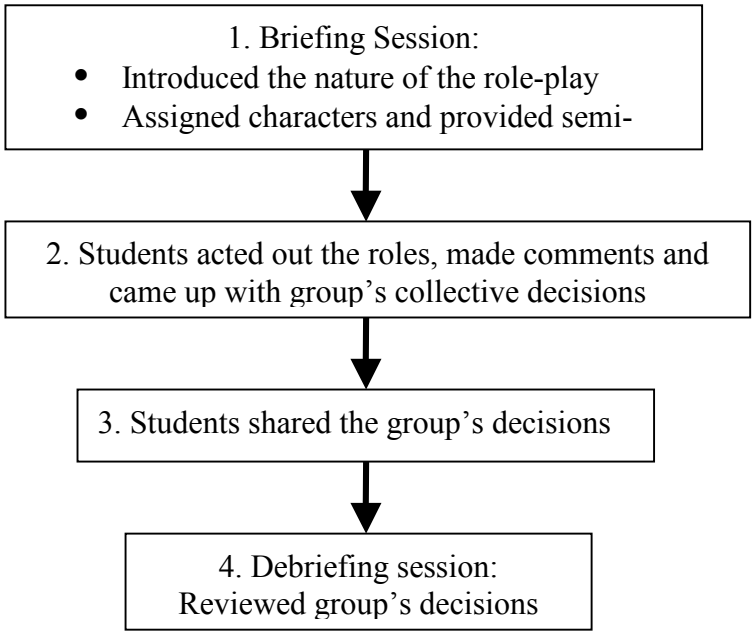

Figure 1: The approach used for the semi-scripted role play.

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A small semi-script with brief descriptions of the player's characters was then distributed to each student playing the particular character. For example, one of the semi-scripts as follows assisted an Earth Science Expert to respond at a particular position in the role play.

> "You are concerned about the amount of carbon dioxide entering the atmosphere. You believe that as more fossil fuels are burned, carbon dioxide levels increase. This creates the greenhouse effect on Earth, because heat energy is trapped by the carbon dioxide layer. You think less fossil fuel should be burned."

The players were given ten minutes to read over their character descriptions before the performance. They were also invited to consider what it was like to take on someone else's role and to face a challenging problem within selected context. Role players were encouraged to ask their own questions, for example, 'What are my thoughts and feelings about this issue? What would be this role holder's beliefs?' What choices are open in terms of relevance to all parties? This also allowed an examination of different viewpoints.

Secondly, the players who were to act out the roles were to make some comments about the likely causes of the so-called greenhouse effect. Each player could then say who they agreed with and who they disagreed with and why.

Thirdly, each group would have to reach a collective decision or statement to be presented to the rest of the class saying what they had agreed upon and what things they disagreed about. Awareness of the scientific and economical perspectives of global environmental issues established a base for such an informed decision making. Fourthly, a debriefing session would be undertaken in which the group statement was reviewed under guidance of the researcher as facilitator.

Using Semi-scripted Role Play in STS Lesson

On the day of the role play, the students formed a small group of six group members. Each student was then assigned a character and provided with a relevant semi-script. Students rearranged the furniture into four groups and sat in a circle. Once the groups were seated, the chairman lead the role play by asking the players to introduce themselves the character they played and to outline their character's view. The players were also reminded about the collective decisions that needed to be made by relying on input and consensus from all group members regarding the discussed issue. Students were observed working in groups, as they discussed the anticipated interactions prior to their interactions. Then the group's players took turns making verbal statements that reflect the character's perspective. For example, aneconomist who had to explain why his/her option was the best economically and scientist who explained why it's the best solution to environmental problems, and the group gave their persuasive argument. Students were observed to be a better involved in the nature of environmental issues than they had evinced in the previous learning session, and less time was spent revising the roles assigned for them.

The researcher had assumed that she would need to play a more active role but, from the very beginning, the students were busy pointing out their views through their characters. The researcher did intervene when she wished to reinforce an issue from a student who had been too vocal, but her own involvement was far less than she had anticipated.

In the previous role play exercises, students were not explained the role that they should play and how to respond from a particular position based on the assigned character's perspective. In contrast, this time more time was spent before, and at the beginning of, the role play explaining the nature of scripted role play and the expected learning outcomes of the activity. Students were told that all characters have roles to play and therefore each character would not be sharing

the same viewpoint and that conflict might result. The class was also reminded that the people they were arguing with might not be expressing their own viewpoint; indeed, they might be arguing a position completely foreign to them. Unlike the previous attempts at role play, more time was devoted to "debriefing" at the end of the session. Each group was given ten minute to share on the outcomes of the role play.

Data Collection

Students were invited to write their reflection immediately after the debriefing session of the role play. Students were asked to reflect on the verbal interaction, the ways in which they had approached and explored the issue, and the ways that their experience might have enhanced their understanding of the issue of greenhouse effect. These written reflections on their learning experiences served as a primary data source. In addition, an informal and unstructured observation was carried out to recordstudent behaviors indicative of engagement in learning. The researcher acted as first observer while a lecturer was invited as second observer. Both observers recorded observations of the learning activities and interactions of students in a journal, these included students' verbal and non-verbal responses during the running of role play. Role Play Evaluation Form was administered to students after the reflection to explore how productive the role play was (Appendix A).

Data Analysis

In the first stage, all students' written reflection was reviewed by coding it into prescribed categories and a summary of the interpretations were prepared. Several recurrent ideas were identified within and among data sets. These categories were then compared and contrasted in order to form more general themes which captured larger aspects of the data. Having identified emergent categories and themes, the data sets were reread in order to identify specific excerpts which signaled these groupings so as to ground the analysis in the data.

In the second stage, the observation data was used to corroborate the emergent themes found in students' written reflections. The validity of observation data was determined by agreement between second observer and the researcher. The quotes provided throughout the "Results and Discussion' section were excerpted from written reflections and observations. All of the names provided are pseudonyms.

The written reflections were shared with a science lecturer as independent rater to check whether she interpreted the information in the same way. The congruence between independent rater and researcher in categorizing student's thoughts was looked for to establish validation in the finding.

Results of Research

Notable changes were noticed in the students' learning engagement during the semi-scripted role play. This was shown through themesemerged relating to the learning experience of students and observation made inthe semi-scripted role play as follows:

Learn to view environment issues from a range of perspectives

Originally, students only got to feel how they view the issues from their own perspective. But through this role play, they admitted that they learnt to consider and think about how others take a stand on and feel about an issue from other's perspective. The following comments illustrate this:

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"Arguing a position which is completely foreign to me is a good exercise. To think of an issue from one angle make me understand that how others view the issue from their perspective." (T2)
"The role play makes me learn more about the issues, from people's different perspective and experience." (T5)
"This activity let me stand in a different angle to think about an issue." (T10)
"I am able to understand the issue better and to correlate my own views with other's views." (T11)

It appeared that assuming the role of a particular character and interacting with other characters in attempting to resolve the issue allowed students to 'get inside' the issue. Students also mentioned that they had gained valuable input as a result of their experiences during the debriefing session. In some cases, they were confronted with new ideas and knowledge as reflected in the following excerpts:

"I learnt a lot of new ideas when teacher ask each group to share the group's idea." (T13)
"The activity is interesting. I like the "report session' after the role play. I got a lot of new info from other group especially about the idea of "replant' and 'reuse." (T15)
Feel more comfortable expressing and sharing views with peers

Students generally felt more comfortable to share their views in a small group role play. Explanations for this change were:

"I felt more comfortable to point out my idea when I discuss in a small group." (T16)
"I like to listen to others. Every group member has his/her own ideas and opinions." (T3)
"In this discussion, I felt very comfortable to express my view and points easily. Our group members works well each other and able to encourage others to contribute points. We also learn how to share opinions and listen to others." (T7)
"It is an interesting discussion. Each group member expresses their opinions in a comfortable way. I learn more from the discussion and listen to different opinions from different people." (T20)
"It has helped me give opinions freely, and get feedback and comments from other group members." (T21)

Observation data further confirmed that students were actively listening to the ideas of others. For example, as one student was pointing her/his views, the rest of the group members were listening attentively, without interruption to her/his argument. The group members subsequently use their reasoning to explain why they agreed/disagreed about from their point of view. It appeared that small group created a safe and active learning environment for students to participate freely in the learning process.

Take responsibility for own learning and making collective decision

Students found the role play had provided an environment to take responsibility for their own learning and making group decision as the following excerpts indicate:-

"The discussion today is very interesting. Each group member can point out their views and argue with each other, many issues were raised up but the agreement was reached in a peaceful way." (T11)
"The time is not enough to discuss, but lastly we come out with our group decision." (T19)

"Some arguments but can come up with a conclusion and agreement." (T20)
"During the role play, I was trying to get more information to argue with others. At the same time I was able to hear other's views that opened my minds to an idea I didn't consider before, so actually we learn from each other." (T26)
"I equip myself with sufficient knowledge in order to create a meaningful discussion.We learn to make our stand by relating it to benefit and problems faced by other communities." (T15)

It was observed that, after each player representing an EE character had presented his/her views before others, that characters' player was given a little time to reflect on their response. Students then came up with a collective decision that involved thoughts and feelings from both sides of the issue and relied on input and consensus from all group members before making a collective decision. One major difficulty with the role play was the fact that the class had only 60 minutes for the discussion. The time was fully occupied but, in the last quarter-hour, the players became more focused on issues as they debated to reach a group agreement.

So even if the role play continued as a debate, it had given students a sense of ownership of the activity and thereby responsibility for the outcomes of the activity.Besides, half of the students noted that, "*I learnt more from the activities*". Thus, the more active students were in determining their own learning, the more they learned.

Have more confidence in personal learning abilities

Students generally felt confident in their own abilities to express their thought verbally about how they feel as an assigned EE character. As some of the students remarked:

"This activity helps me to express my thought about how I feel as an Economic Spokesperson for Brazil." (T 18)
"Through this discussion, I learn to express my thought verbally." (T17)
"Debating and confronting other's idea teach me to be more confident. I must have sufficient knowledge and evidence to support my idea." (T25)

Students appeared to have made use of semi-script to reason about the global issues as defined by the role. This showed the provision of guiding instructions in the form of semi-scripts of characters at various points made students feel more confidence to express their views verbally.

Learn to make links and transfer ideas

During the defense of the argument that destruction of the forest contributed to the temperature rise, Chong was observed to refer to her prior experiences and evidence in Sarawak and Genting Highland to provide direct support for her argument. She attested to the following:

"The role play enables participants to give their views with supporting evidence instead of discussing aimlessly." (T24)

Whereas another student expressed a similar idea, only in slightly different words:

"I did not discuss aimlessly, I gave my view based on evidence." (T22)

Students appeared to link effectively their scientific knowledge of ecological concepts introduced in lectures that reflect their concern.

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Active involvement

Based on observational data, students demonstrated high levels of engagement during this activity. Although some forceful argument did take place in the role play, it was clear from the outset that the students were quite animated in their role. For instance, Jenny who represented an Economic Spokesperson for Brazil opposed to the fact that deforestation contribute to the increase of planet's temperature. She was disagreeable and insulting at times, in her way debating style to try to defend her view and convince others to agree with her position. No doubt that she was simply embracing the spirit of the exercise.

Another student, Lee, representing an Earth Science Expert used Japanese accent while stressing his view. The way in which he acted like an Earth Science Expert from Japan was a clear signal to all that student was in character. Students who had been reluctant to speak before the role play now spoke. They now could make statements that reflect the character's perspective! As students articulated it very eloquently:

> *"Each of us involved actively in the discussion, no party was excluded. Everyone shared info and experience." (T12)*
> *"Each of us can take part. Everyone has her/his idea to point out, clarify, make judgement and negotiate before we make our stand."(T6)*

Promote critical and creative thinking

This appeared to be a constructive engagement among students as many of them expressed that the role play provided an opportunity to think critically and creatively:

> *"We have to analyze others' views before we give our comments. Therefore, it promotes my thinking and understanding." (T1)*
> *"The role play acts as a good strategy to stimulate our critical thinking. We need to think critically to support our stand. We share views based on evidence." (T4)*
> *"The discussion in a role play enables me to defend my views and confront other's view critically." (T8)*
> *"Role play discussion has given me an opportunity to learn to give my own views and at the same time to analyze other views with an open mind." (T9)*

Students also noted that the role play encouraged them to respond spontaneously to defend their views, hence extends their creative thinking.

> *"The role play really helps us to become more creative in delivering spontaneous idea." (T23)*

Learn to respect and value other views

Students generally felt that the role play provides an outlet for fostering respect and appreciation for diverse views as the following excerpts indicate:-:

> *"From the role play discussion, I found out that lots of ideas came out from all group members. I learn that I have to defend my point of view with facts and statistic. However, we cannot overlook the facts given by other members. All their point of view and opinion have to be taken into consideration."(T24)*
> *"I learn to respect each other during the dialogue as we must listen to the views of other." (T18)*

It is not surprising; therefore, that role play discussion has developed a learning community to value and respect for other students' contribution and differences.

The moral of the activity

In the debriefing session, it was surprising to find that none of the groups was supporting the view for human contributions to global warming. They all expressed concerned over the rapid increase in carbon dioxide levels in Earth's atmosphere which have contributed to changing weather patterns, ice ages, and fluctuations in sea level. All the groups agreed with the point that development still can be carried out, with the condition that a proper plan and management need to be thought carefully for the sustainability of the natural environment and resources. This was clear when one group made this statement that "*We think that protect our mother earth is very important. We really need development to make our life better but we don't forget that we live on the earth. If the earth becomes ill, how can we live comfortable*?"

Susan, who initially opposed rainforests protection was finally influenced by arguments and changed her existing stand. She learnt to consider the point that the fulfillment of human needs had to be balanced with the protection of the natural environment, so that these needs could be met not only in the present, but also in the future.

How productive was the role play?

At the end of the role play, students were asked to fill in an evaluation form specifically addressing how productive the role play was (Appendix A). The feedback was very positive, and the most significant comment was that a highly productive session had been held during the role play. The overall responses included:-

"Ideals were encouraged and fully explored." (96%)
"We all stayed on target." (100%)
"Discussion made to come out with genuine agreement of the issues." (96%)
"A highly productive session was held." (100%)

Additional written comments were:

"*The discussion keeps us on track and avoids members to escape from giving their point of view."*
"*Time is optimized and fully used to discuss our idea."*
"Have a clear view of the issues discussed."
"Learn more from the activities."

Students also found some value added to the role play. Their responses were:-

"*Gain some new knowledge about the issues."* (92%)
"Many new ideas generated by group members." (96%)
"My friends are too creative." (92%)
"Make lesson more interesting and meaningful." (100%)
"*Ideals were brought out in a creative way."* (96%)

However, one concern brought out by some students that there were time constraints to discuss the issues because they *"have many ideas to share and explain to others"*.

How could semi-scripted role play be improved?

Despite the strong support for role play, the students were asked to consider ways in which the semi-scripted role play could be improved. It was found that only one student offered comment in response to this question as follows:

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"Discussion in a role play form is interesting. However, choosing our own group partners is better as some of us dare not to speak out our opinions in front of someone who we do not know well." (T14)

This suggested a weakness of face-to-face role play. The fear of looking or acting stupid or upsetting others might inhibit how an individual might act out a role.

Discussion

The Kolb and Fry (1975)'s four learning environments as employed in the semi-scripted role play had engaged students actively in evaluating and resolving an environmental issue.The engaging learning experience that students found from the semi-scripted role play was to feel how they view the issues from their own perspective and think about how others take a stand onan issue. Semi-scripted role play took students into a realm where they needed to consider the thoughts of others, and learnt to see different and broader perspectives. Role play thus helped deepen student understanding, and opened their minds to an idea they didn't consider before. This result is consistent with previous study showing that students are able to attribute to others motives they recognize in themselves after being helped to take the point of view of the other through role-playing (George & Lawrence, 1982). As Freeman & Capper (1998) remarked following an evaluation of their web-based role play, students "achieved a deeper understanding of their own views and those of others."

Compulsory participation in a small group role play broke the ice and built the confidence. The students had the opportunity to discuss democratically and negotiate situations. As participation grew, ownership grew and that bond led the students to make collective decisions. Students knew that they were full partners in this learning environment and shared the responsibility for the learning process. Hungerford & Ramsey (1994) also found that students in a role play not only become experts regarding an issue, but they also derive a sense of ownership toward that issue.

The provision of guiding instructions in the form of semi-scripts assisted students to respond at a particular position from the assigned character's perspective. At the same time, students were encouraged to reflect on their learning by asking questions on what it was like to take on someone else's role. As a consequence, students felt more comfortable and confidence to express and share their views verbally.

A small-group learning environment had provided students with better opportunities to engage in active learning. Students were animated in their role even though they argued a position which was completely foreign to them.As Errington (1991) noted that learning in environmental education by means of a role play is able to engage students in active learning experiences. Students also became more comfortable with expressing their opinions in a small group role play setting. As a group, students felt comfortableenough to contribute ideas and actively listen to the ideas of others.Keogh and Naylor (2007) noted that an appropriate climate allows pupils to feel comfortable about sharing their ideas and misconceptions without ridicule or embarrassment. Not only that, small group role play setting had fostered respect and appreciation for diverse views. Students learned to respect and value other views even though they were not sharing the same viewpoint.

In addition, students appeared to use appropriate ecological concepts to provide direct support for their argument that reflect their concern. As Alden (1999) has claimed that role play encourages students to reflect on their knowledge of EE and to use appropriate concepts when articulating their response to the role play setting.

Semi-scripted role playencouraged students to begin thinking critically about an

environmental issue as theyanalyzed others' views, made and defended distinctions, and sought evidence. Consequently, critical thinking is enhanced when students learn to teach themselves to analyze ideas, weigh evidence, and decide what data or information to support the ideas (Pithers& Rebecca, 2000).

Students appeared to develop sound moral reasoning skills to reach the higher stages of moral development. They carefully examined his/her own values and begin to examine them from another's point of view. Students not only saw that there were different views about what was right or wrong, but that students could make moral judgement from the discussion. Finally agreement was achieved by group members, based on their own set of values, to protect the natural environment and the well-being of future generations. At this stage, students appeared to derive the term of *sustainable development,* which means development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations World Conference Environment and Development, 1987). This result is consistent with the view of Murdoch (2007) who noted that role play permits learners to consider the values and attitudes that underpin people's responses to the environment and, in so doing, clarify their own values.

Results presented in Role Play Evaluation Form showed a highly productive learning session had been held during the role play. Students indicated that semi-scripted role play made them to stay on task, encourage and fully explore ideas, and achieve genuine agreement and support during the group interaction.

Conclusion and Implications

Trying a semi-scripted role play to engage students in a process of active learning had helped the researcher to address the concern about teaching in STS. This action research aimed to investigate if there would be a difference in the way students engaged themselves in a semi-scripted and non-scripted role play. The semi-scripted role play did help the students escape the trap of blank slates and to put themselves into a person's shoes. Students got to feel for the character they were playing and understood what the perspectives of other characters were. Semi-scripted role play gave students authentic experience in the process of making important decisions about the environment. Students generally felt 'ownership' of the activity. The provision of guiding information via semi-scripts, somehow made students feel empowered to express, share, argue and negotiate more comfortably and confidently than they were in non-scripted role play. Students became better equipped to critical thinking. The role play had helped create an engaging learning experience among the students that researcher will certainly continue to use it in the STS lesson for the coming semester.

There are some things will be improved if this semi-scripted role play is repeated in future lesson. For example, the discussion hours will be extended to 90 minutes. This is to make sure that students could use the time effectively in exploring the issue. Students will be given chance to self-select their own group members as their group players. Students will be assigned to look into local environmental issues. For example, exploring the issue of rain forest destruction in Malaysia could instill concern for the local environment, and to have students understand their role and responsibility in disseminating environmental messages to the community. The second loop of action research will look into those issues to further improve the teaching and learning in STS using semi-scripted role play.

On the whole, a highly beneficial learning experience was gained from the semi-scripted role play. It was worried at the beginning whether the semi-scripted role play would provide students an engaging learning experience, and how productive trainee engagement in the role play would be. It was surprised at how well the semi-scripted role play carried out, and how much more it taught the researcher about the metaphor of the 'classroom as learning place'.

Better learning would occur in the classroom if students were empowered to articulate ideas and process information in ways that were meaningful to them. This experience helped improve the teaching skills and enable the researcher as an educator to provide a better STS learning for the next cohort of students.

Limitations

A limitation inherent to this action research is the situated nature of the study to a single master student's classroom. The data that was collected and analyzed here is specific to these 26 students and may not generalize to the population of in-service master students in Science Education. A further limitation in this study is noted in the lack of student interviews as a data source to support the results.

References

Alden, D. (1999). Experience with scripted role play in Environmental Economics.*The Journal of Economic Education*, 30(2), 127-132.

Darlene, R. Stille (2006). *The greenhouse effect: warming the planet (exploring science*). Minneapolis: Compass Point Books.

Errington, E. (1991). Role play and environmental issues**.** *Australian Journal of Environmental Education*, 7 (August), 1-15.

Freeman, M., & Capper, J. (1998). An anonymous asynchronous web-based role play. *Australian Journal of Educational Technology*, 15(1), 95-116. Retrieved 05/01/2012, from http://www.ascilite.org.au/ajet/ajet15/freeman.html.

George, P., & Lawrence, G. (1982). *Handbook for Middle School Teaching*. Glenview, Illinois: Scott, Foresman and Co.

Huckle, J. (1993). Environmental education and sustainability: A view from critical theory. In J. Fien (Ed.) *Environmental Education: A Pathway to Sustainability* (Chapter 3). Geelong: Deakin University Press.

Hungerford, H. R., & Ramsey, J. M. (1994). *A Prototype Environmental Education Curriculum for the Middle School (Environmental Education Series, No. 29)*. Paris: UNESCO/UNEP.

Intergovernmental Panel on Climate Change (2001). *The Scientific Basis*. New York: Cambridge University Press. Retrieved 05/01/2012, from http://www.grida.no/climate/ipcc_tar/wg1/pdf/WG1_TAR-FRONT.PDF

Kolb, D. A., & Fry, R. E. (1975). Toward an applied theory of experiential learning, In C. Cooper, (Ed), *Theories of group processes*. London: Wiley Press.

Ministry of Education Malaysia (2003). *Syllabus for KPLI Environmental Education*. Teacher Education Division: Kuala Lumpur.

Milroy, E. (1982). *Role-play: A practical guide*. Aberdeen: Aberdeen University Press.

Murdoch, K. (2007). Teaching and Learning to Live With the Environment. In J. P. Stoltman et al. (Eds.), *International Perspectives on Natural Disasters: Occurrence, Mitigation, and Consequence.* University of Melbourne.

Nestel, N., & Tierney, T. (2007). Role-play for medical students learning about communication: Guidelines for maximizing benefits. *BMC Medical Education*, 7, 3. Retrieved Jan 01/02/ 2012, from http://www.biomedcentral.com/1472-6920/7/3.

Pithers, R. T., & Rebecca, S. (2000). Critical thinking in education: a review. *Educational Research, 42 (3),* 237-249. Retrieved Jan 04/01/ 2010, from http://dx.doi.org/10.1080/001318800440579.

RECSAM (2000). *Workshop on active teaching and learning approaches*. Penang: RECSAM.

Sogunro, O. A. (2004). Efficacy of role-playing pedagogy in training leaders: some reflections. *Journal of Management Development,* 23, 355-71.

SPPS (2011). *Table 3: Summary of information on course Science, Technology & Society*. Kota Kinabalu: University Malaysia Sabah.

Stapp, W. B. (1974). Historical setting of environmental education. In J. A. Swan & W. B. Stapp (Eds.), *Environmental education; Strategies toward a more liveable futur*e. New York: Sage Publications.

Tolan J., Lendrum, S. (1995). *Case Material and Role Play in Counselling Training.* London: Routledge.

United Nations World Commission on Environment and Development, Our Common Future (The Brundtland Report) (1987). Oxford: Oxford University Press.

VanMents, M. (1983). *The Effective Use of Role Play: a handbook for teachers and trainers.* London: Kogan Page.

APPENDIX A

Role Play Evaluation Form

Rate the extent to which your group performed in the semi-scripted role play by giving comments on the alternatives which you think would best represent it.

How productive we were	Alternatives	Comment
Effective use of time	Much time spent without purpose	
	Got off track frequently	
	Did well, once we got our ideas clear	
	No wasted effort – stayed on target	
Development of ideas	Little done to generate ideas	
	Ideas were imposed on the group by a few	
	Friendly session but not creative	
	Ideas were encouraged and fully explored	
Ability to decide issues	Poor resolution of difference	
	Let one person rule	
	Made compromises to get the job done	
	Genuine agreement and support	
Overall productivity	Did not accomplish our goal	
	Barely accomplish the job	
	Just did what had to	
	Held a highly productive session	

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