

ISSA Proceedings 2002 - The Effects Of Different Socio-Economic Factors, Language Environments And Attitudes Of First Year Natural Resources Students On Their Performance In A Critical Thinking Appraisal



1. Introduction

The United Nations Educational, Scientific and Cultural Organization (UNESCO), after consulting a wide variety of sources including results of many national and regional conferences and many experts in different fields of study, published a document titled: *Educating for a Sustainable Future: A Transdisciplinary Vision for Concerted Action* in 1997. In this document under curriculum reform, the following recommendation was made: 'Students need to learn how to reflect critically on their place in the world and to consider what sustainability means to them and their communities. They need to practise envisioning alternative ways of development and living, evaluating alternative visions, learning how to negotiate and justify choices between visions, and making plans for achieving desired ones, and participating in community life to bring such visions into effect. These are the skills and abilities which underlie good citizenship, and make education for sustainability part of a process of building an informed, concerned and active populace. In this way, education for sustainability contributes to education for democracy and peace.'

It was clear from this document that critical thinking or, how to reflect critically should, in the future become an integral part of education and training in all fields of study. Against this background the aim was to establish if the first year students in the discipline of Natural Resources did have the skills, knowledge and attitudes for critical thinking, and if not, a possible explanation for the situation.

The initial intention of the investigation was to research the issue of critical thinking ability within the Namibian context. The latter may differ from other countries, as seen against previous research done on this issue. Namibia is regarded as a developing country, while most of the research has been done in developed countries. Political ideologies and policies which have an influence on all aspects of the life of the citizens of a country are not the same for all countries but in some cases differ radically from each other.

In certain rural areas in Namibia, communities still actively practise their traditions and cultures as they have done for the last centuries. In most communal areas socio-economic conditions are characterized by subsistence livelihood and a high rate of unemployment. As a result many adults moved to urban areas to seek employment and in many cases women became the main source of income for a household. Children in these cases are usually taken care of by other family members, namely the extended family.

This research can best be described as illuminative, to provide data that may shed light on or go some way towards explaining a situation, and retrospective, in that it is concerned with events which have already occurred (Parnell 1993).

In this paper the investigation regarding the socio-economic factors will be discussed in detail while investigation regarding language environments and attitudes will be briefly reviewed.

2. Methods

The aim of the study was to determine which factors have a significant influence on the performance in a critical thinking appraisal of a sample group. Two issues had to be considered. First, of all possible factors, which factors should be investigated? The second was the sample group. First year Nature Conservation and Agricultural students were chosen as the sample group due to the involvement of the faculty member with these students. These two programmes are grouped together within the Polytechnic of Namibia under Natural Resources. The investigation was directed toward previous experiences of the first year students and the development of their critical thinking abilities before entering an institution of higher education, which in this case was the Polytechnic of Namibia. The sample group, therefore, consisted of first year students only, excluding those students who had repeated their first year.

2.1 Socio-economic factors

The socio-economic background of the sample group was investigated specifically

in terms of the educational background of the family support group and their financial status in terms of occupation and access to modern facilities. It was assumed that the historical and political background of the sample group might have influenced their critical thinking abilities, especially due to the fact that some of them came from a background where few of the family support group had advanced to the final school year which determined not only their level of education, but also their job opportunities and standard of living. This assumption was also made on the grounds of previous research done in this field.

Frequencies were first determined for each item to establish the compilation of the sample group, which in this case was predetermined as all Natural Resources first year students. The purpose was to establish if the group could be divided into separate populations in terms of their socio-economic background. A second step followed where participants were divided into 2 groups (populations) in cases where the question had many subdivisions (ranks), for example, one of the questions of the questionnaire determined through six subdivisions (ranks) the academic qualifications of the participant's female guardian in the years 7 - 14. This was pooled into two groups, namely, uneducated females (7 years and less schooling) and educated females (8 years and more schooling). These two populations for each question were then crosstabulated through the *chi-square* test to show if the tested factor (e.g. education of female guardian during years 7 - 14) showed an association/relationship or not with the critical thinking abilities of the participants.

The second stage of the investigation was to determine if the sample group could be divided into separate populations in terms of their critical thinking abilities. If such differences exist, the question is what different treatments from their socio-economic environment can be associated, or related to such differences.

The Watson-Glaser Critical Thinking Appraisal (Watson & Glaser 1980) was used to determine the critical thinking ability of the participants. The test consisted of five subtests, namely:

Test 1: Inference

Test 2: Recognition of Assumptions

Test 3: Deduction

Test 4: Interpretation

Test 5: Evaluation of Arguments

The five abilities tested in the subtests are regarded as critical thinking abilities.

In scoring the test, the correctly marked spaces had to be counted to determine a raw score out of 80, the maximum raw score. The examinees were ranked in order of performance, which were:

below average (less than 50%),

moderate (50 - 59%),

good (60 - 69%) and

excellent (70% and above).

2.2 Language environments

A questionnaire was compiled with the intention to determine the sample group's language environment in the home and throughout their school-going years. This was done because of the unique situation in Namibia where English is the official language while only a small percentage of the population have English as their mother tongue. In the sample group no students had English as their mother tongue.

2.3 Attitude

A questionnaire was compiled through a literature review. Experts in the field of critical thinking described certain dispositions/attitudes associated with a critical thinker. These were used as questions in a questionnaire under the title: Self-evaluation.

In both surveys mentioned in 2.2 and 2.3 the final part of the investigation in terms of frequencies and critical thinking abilities were compiled in a similar manner to what was described in number 2.1.

3. Results

The *chi-square* measure of association was used to determine relationship/association between characteristics established through the questionnaires (survey) and different ranks of performance in the test of the sample group.

For the questionnaires, the 0.05 level of significance for a two-tailed test was used (except in the case of 'attitudes' in which case the 0.1 level of significance was used). Significance for a two-tailed test was used because the research question/hypothesis was nondirectional.

The data from the questionnaires and critical thinking test were processed. The SPSS (Statistical Package for Social Sciences) programme/software was used for this purpose. Data were presented as follows:

1. Frequencies in terms of the different ranks/categories for the different

questions in the questionnaires and performance in the critical thinking test were calculated. These data gave a good picture of the general profile of the sample group.

2. Crosstabulations were done between the results of the different questions in the questionnaires and performance in the critical thinking appraisal. In each case a *chi-square* test was carried out on the data obtained to determine if it was significant and to conclude if there was a difference between the two sets of scores. For the purpose of the investigation and after the results of the frequencies for the different items became known, it became clear that certain questions of the questionnaires could be left out in the further analysis and in other instances data could be pooled into fewer categories. This step was also necessary because one of the rules for *chi-square* tests states that the number of items appearing in the 'expected' category obtained during the stages of computation must at least be five. Despite the pooling of data, it was not always possible to have at least five items per category, without jeopardizing the results. However, according to Clegg (1993) some statisticians are of the opinion 'that it doesn't matter all that much'.

4. Discussion

In general, the results of the frequencies for the different items on the questionnaires showed that the sample group indeed represented, to some extent, the broader population of Namibia, if compared to results obtained by censuses done by various governmental organisations (Ministry of Higher Education, Vocational Training, Science and Technology Document on Important and Relevant Socio-Economic Data for Science and Technology Planning in Namibia, 1999).

According to this document, the majority of Namibia's population live in rural areas. Also, according to the document almost 9 out of 10 persons between 15 - 24 years are literate, but the literacy rates start to decline at the age of about 25 years. Questionnaire results also showed that most of the parents/guardians of the sample group either had less than seven years of schooling, or the years of formal education were not known by the respondents. The document figures, as with the questionnaire, showed that 'subsistence farming' is the most common main source of income for female-headed households. Also significant was that in both surveys, the radio was identified as the most popular communication medium compared to newspapers and television.

A *chi-square* test carried out on the data obtained in a crosstabulation of

'performance in a critical thinking appraisal' with the 'years of schooling of female adults with whom the sample group spent most of their time' (age group 7 - 14 years), was significant at the 0.05 level ($X^2 = 8.42956, df = 3$). It was concluded that there is a relationship between the different numbers of years of schooling of female parent/guardian and ranks of performance in a critical thinking appraisal. Similarly, Ennis *et al.* (1985) found a low positive correlation of .15 between achievements in a Cornell Critical Thinking Test and socio-economic status.

Exactly the same results were obtained in the case of male parent/guardian. Both results showed a relationship/association between an educated adult who can be a parent or other family member, in the development of the child from 7 to 14 years and critical thinking ability. This may imply that to educate the children only is not enough in situations where the parents (guardians) are uneducated or had only a few years of schooling. Both the children and the adults should be educated simultaneously, although the methods may, or should differ for adult education. Subsistence farming is the most common main source of income for female-headed households in Namibia and also 72% of Namibia's population live in rural areas. Development programmes for developing countries must cover all aspects of life and lifestyle, e.g. economic growth, social planning, human resource development, community organisation, meeting basic human needs, self-reliance, liberation, participation and transformation. In the last four instances, practising critical thinking skills may enable people to become self-reliant, liberated, participatory and transformed. The National Broadcasting Corporation of Namibia can also play a valuable role in this regard in the light of the majority of the people having access to a radio.

Development programmes should be directed towards helping people to deal with a fast changing world. One model with one ultimate goal cannot be the answer to life-long development. It should include economic betterment, greater human dignity, security, justice and equity. Communities have no problem in identifying problems experienced by them but in most cases they are not successful in identifying opportunities. For a development programme to be successful one should analyse the forces that influence people and assist them in making decisions that will improve their lives. Rural communities should be taught how to solve their own problems by teaching them critical thinking skills. If parents start practising critical thinking skills, children may grow up in an environment which will enable them to become critical thinkers themselves. In communities where

the average number of years schooling of adults is below 7 years, development agencies from the public and private sector have the task (through informal/non-formal education) to empower the people by teaching them critical thinking skills so as to enable them to become problem solvers and to enable them to teach these skills to their children as well.

Bransford and Stein (1987) emphasize five components of thinking which would be present in the ideal problem solver. These include:

the ability to *identify* problems;

the ability to *define* problems and communicate them with precision;

the ability to *explore* possible strategies;

the ability to *act on* these strategies;

the ability to *look at* the effects.

A *chi-square* test carried out on the data obtained in a crosstabulation of 'performance in a critical thinking appraisal' with 'grades obtained in English in the final school year', was significant at the 0.05 level ($X^2 = 12.71557$, $df = 6$), and so it is concluded that there is a relationship between grades obtained in English and ranks of performance in a critical thinking appraisal.

A *chi-square* test carried out on the data obtained in a crosstabulation of 'performance in a critical thinking appraisal' with 'performance in a self-evaluation test' in terms of attitude was significant at the 0.1 level.

($X^2 = 16.25223$, $df = 9$), and so it is concluded that there is a relationship between different ranks of performance in an attitude test and ranks of performance in a critical thinking appraisal. The attitude test consisted of questions directed at required attitudes for critical thinking. Many of these questions are also linked to self-confidence and self-esteem.

5. Conclusion

Education is recognized as a driving force for changing values and mindsets, which can in turn lead to behavioral change. Education is an integral element in debates on such key issues as poverty, population, health, employment, environmental management, consumption, production and technology transfer, all of which are essential ingredients of sustainable development (Fifth Annual World Bank Conference on Environmentally and Socially Sustainable Development, 1997). In the introduction the importance of developing critical thinking abilities (knowledge, skills and attitudes) was also stressed for educating for a sustainable future.

Formal education should, therefore, be more than just the transfer of knowledge. In the modern world, science and technology are developing at such a pace that knowledge soon becomes outdated, if not irrelevant, with new knowledge constantly being created. Learners should be taught how to reflect critically on their place in the world, to practise envisioning alternative ways of development and living, evaluating alternative visions, learning how to negotiate and justify choices between visions, and participating in community life to bring such visions into effect. The investigation has pointed out possible barriers in the development of critical thinking in learners, namely, parents/guardians who are uneducated/undereducated in terms of schooling, a low standard of English proficiency (official language), and a lack of attitudes/dispositions which will enable learners to practise critical thinking. Formal education should find ways to address the language issue, but the importance of adult education (non-formal or formal) should also be stressed. Adult education should also include more than just skills training, which is normally the case. Critical thinking skills should be incorporated in all training courses/programmes. Empowerment through which adults become self-reliant, liberated, participatory and transformed must be the goal of all courses/programmes. A change of attitudes is therefore necessary.

A learning network should be created with the purpose to build an informed, concerned and active populace. Education (formal and informal) for children and adults should result in true democracy and peace. And the tool for accomplishing such a goal should be the teaching and practising of critical thinking.

REFERENCES

- Bransford, J.D., Stein, B.S. (1987). The ideal problem solver. In: Ennis, R.H.: A taxonomy of critical thinking dispositions and abilities. In: Baron, J.B. and Sternberg, R.J. (Ed.): *Teaching Thinking Skills: Theory and practice*. New York: W.H. Freeman and Company.
- Clegg, F. (1982). *Simple statistics: A course book for the social sciences*. Cambridge: Cambridge University Press.
- Ennis, R.H., Millman, J., Tomko, T.N. (1985). *Cornell critical thinking tests level x and level z. Third Edition*. Pacific Grove: Midwest Publication.
- Ennis, R.H. (1987). A taxonomy of critical thinking dispositions and abilities. In J.B. Baron and R.J. Sternberg (Ed.): *Teaching Thinking Skills: Theory and Practice*. New York: W.H. Freeman and Company.

Ministry Of Higher Education Vocational Training, Science And Technology. (1999). *Important and relevant socio-economic data for science & technology planning in Namibia. Document prepared for World Conference on Science in Budapest.*

Parnell, J. (1993). *Approaches to research in education.* Study Guide. University of Surrey: Department of Educational Studies.

United Nations Educational Scientific And Cultural Organisation (Unesco). (1997). *Educating for a sustainable future: A transdisciplinary vision for concerted action.* Thessaloniki: International Conference.

Watson, G., Glaser, E.M. (1980). *Watson-Glaser critical thinking appraisal.* Psychological Corporation, Harcourt Brace Jovanovich, inc.