



Assessment of How Success Criteria in Secondary School Biology Syllabi Address Environment Degradation. Case Study of Karonga District.

Jacob E. Chiyombo, Prof. Dr. Vinnaras Nithyanantham

Student, Supervisor

Education Department, DMI-ST. Eugene University, Zambia.

ABSTRACT

The purpose of this study was to assess how success criteria in secondary school Biology syllabi are framed to address environmental degradation in Malawi. A quantitative methods was used in this study. Sixty secondary school teachers were selected from 40 secondary schools in Northern Education Division in the Ministry of Education in Malawi as research participants. Schools and participants were selected through convenience and purposive sampling techniques respectively. In this study, data was collected through interviews, questionnaire and document analysis. Data analysis was done thematically and using statistics. The research study found out that the success criteria, content in Biology would not address environmental degradation because success criteria were not framed well and had many action verbs such as 'explain', 'describe' and 'state'.

Key words: Environmental degradation, Environment, Assessment

Introduction

Environmental degradation as an aspect of climate change has become a major global and common concern throughout the history of human kind. According to Kumar, Singh and Kumar (2020), Environmental degradation is defined as the deterioration of the environment through the depletion of resources such as air, water and soil, destruction of ecosystems, habitat destruction, extinction of wildlife and pollution. This portrays that if environmental degradation is not addressed now, its effect will be huge and sustainable development is likely to be affected since it has already observable impacts on the environment. According to Greenfield (2020), a 2020 report by the World Wildlife Fund found that human activity, specifically over consumption, population growth and intensive farming, has destroyed 68% of vertebrate wildlife since 1970.

The Global Assessment Report Biodiversity and Ecosystem Services published by United Nations'(UN) IPBES in 2019 says that roughly one million species of plants and animals face extinction worldwide from human causes such as expanding human land use for industrial agriculture and livestock rearing, along with overfishing (Watts, 2019).

Institute of Education (MIE) 2015, explains that the functioning of Malawi's natural system, with major implications for several weather sensitive such as environment, agriculture, forestry, water resources, energy and fisheries; human systems particularly human health and human settlements, are threatened by environmental degradation.

RESEARCH METHODOLOGY

Durrheim (2006) defines Research design as a strategic framework that guides research activities to ensure that sound conclusions are reached. In this research, the researcher used mixed methods of both Qualitative and Quantitative. According to Creswell (2014), mixed methods research is an approach to inquiry involving collecting both, quantitative and qualitative data integrating the two forms of data and using different designs that may involve philosophical assumptions and theoretical frameworks. It is important to use combined quantitative and qualitative approaches because they provide a more complete understanding of a research problem than using either approach alone.

Bitsch (2005) attests that qualitative data analysis is a systematic process of selecting, categorising, comparing, synthesising and interpreting data to provide explanations of a single phenomenon of interest. Qualitative approach helped the researcher to ask questions with the aim of finding out how information teachers prepare themselves to address environmental degradation and hence, it was easy for the researcher to collect data which was not quantified.

Quantitative research is an approach for testing objective theories by examining the relationship among variables (Creswell, 2014). This approach simply measures or counts attributes through answering the "how many" questions. Data is interpreted numerically for easy analysis and the researcher used Computer excel software package for the interpretation of data using tables, a graph and a pie chart.

Population of the study

The researcher got a sample from the target of secondary schools in the study with a target sample of secondary school Biology teachers in the Northern Education Division. A sample of sixty (60) Biology teachers was obtained from a target population of eighty five Biology teachers. To come up with a sample of sixty Biology teachers, the researcher used purposive sampling whereby two Biology teachers were selected from each of the fifty sampled secondary schools.

Sample procedure

The researcher used purposive sampling to make sure that each school had one teacher from junior section and another one from senior section. Purposive sampling involves selecting participants based on the researcher's judgement about certain characteristics being sought to meet the objectives of the study (Cohen, Mario & Mourisson, 2007). Out of 50 Secondary school that is, 25 public secondary Schools that is, Conventional and Community Day secondary schools (CDSSs) and 15 private secondary schools only 40 secondary school in Karonga where the research study was conducted, forty (40) schools were sampled for this study using a statistical formula for calculating sample size in known population taking into consideration the p-value of 0.5, level of confidence 90%, and a margin of error of 10% (Creswell, 2014). The researcher used purposive sampling in the selection of specific schools where the study was conducted per district, because it gave chance to both private and public secondary school to take part in the study.

Sample size

Sample size refers to the number of participant or observation included in the study. Sixty Biology teachers out of 80 b Biology secondary school teachers were selected randomly across Karonga District to be part of the sample. These teachers were chosen regardless of the sex. According Tayie, (2005) explains that for degree of precision 25 and 45 percent can be accepted for wider population so the sample is in line with what is recommended.

Sampling Area

The study was carried out in forty secondary schools within Northern Education Division (NED) in the Northern Region of Malawi. The study took place in secondary schools found in Karonga. Only Biology teachers took part in the research since the purpose of the study was to assess teaching and learning methods for secondary school biology subject content as an approach to addressing environmental degradation in Malawi. Case study of Karonga district. The researcher chose that Biological area for the study because there is an alarming rate increase of environmental degradation due to an increase of infrastructure, destruction of

Karonga cultivate cotton plantation, rice and cassava farming activities. Hence, by conducting the research in this study location, it helps Biology teachers in secondary schools to find solutions or mitigation measures for Environmental Degradation when delivering lessons related to environmental issues.

Sources of data

The data collected was both secondary and primary. The secondary data was portrayed when syllabi of biology of both junior and senior was collected to analyse success criterion. The primary data was when questionnaire was employed for data collection

RESULTS AND DISCUSSIONS

To assess how the success criteria in secondary school Biology syllabi are framed to address **Quantitative Data**

Below is the presentation of the results from quantitative data:

Demographic data of respondents

Distribution of teacher respondents by gender

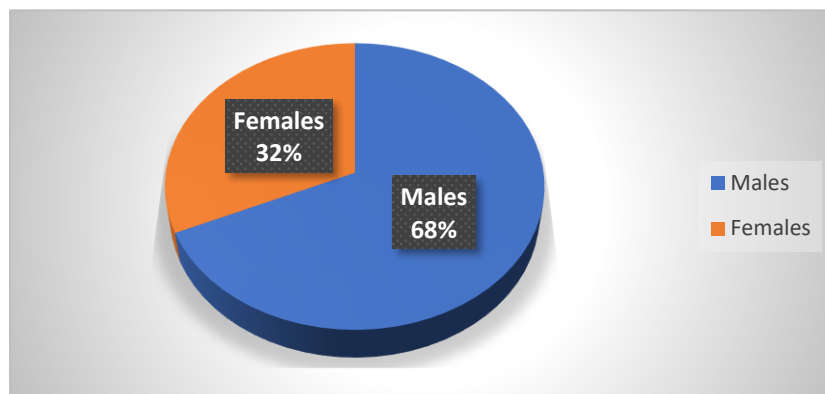


Figure 1 Distribution of teacher respondents by gender

Data on gender of respondents showed that 19 Biology teachers representing (32%) were females and 41 Biology teachers representing (78%) were males as shown in the Figure 1 above. The findings indicated that more than half of the respondents were males while the females were below half of the respondents, indicating that in the Karonga, there are very few female Biology teachers. The percentage of females is smaller compared to percentage of males because in most of secondary schools in the Northern Education Division, there were no Biology female teachers. This disparity would have an effect on the responses as the gender ratio was included in order to gain a perspective on the general understanding of Environmental Education by males and females who participated in the study.

Highest qualification for respondents

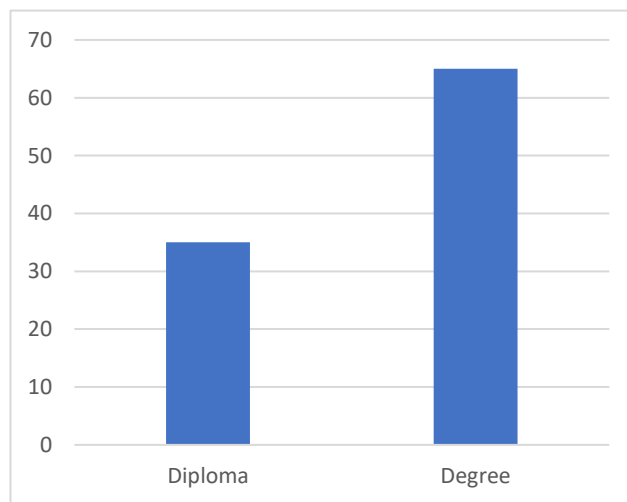


Figure 2 Percentage of highest qualification for respondents

The results of Biology teachers' qualifications in Figure 2 above indicates that 35 Biology teachers had diplomas, representing (35%), while 65 Biology teachers had Bachelor of education, representing (60%). Hence, all respondents had the required qualification to teach Biology subject in secondary schools.

Assessing how the success criteria in Secondary school Biology are framed to address environmental degradation

Table 1: Analysis of success criteria in the Junior Secondary School Biology syllabus

Junior Secondary School Biology content	Success Criteria address environmental degradation	Success criteria do not address environmental degradation	
Selected topics related to Environmental Degradation	Frequency (<i>f</i>)	Frequency (<i>f</i>)	Total Frequency (<i>f</i>)
Organisms and their environment	1	3	4
Plant diversity	0	4	4
External features of flowering and non-flowering plants	1	3	4
Plant structure and functions	0	2	2
Total	2 (14%)	12 (86%)	14 (100%)

Success criteria address Environmental degradation = 14%; Success criteria do not address Environmental degradation=86%

The topics indicated in Table 1 were selected from the Junior Secondary School Biology syllabus using purposive sampling technique in order to choose the topics related to environmental degradation. The findings in Table 1 which were the summary document analysis of success criteria showed that 2 success criteria representing 14% of the sampled topics address environmental degradation while 14 success criteria representing 86% of the total frequency of success criteria in the sampled topics do not address environmental degradation. Most action verbs that were used in the success criteria do not encourage learners to learn through practice in all different activities. Therefore, they would not help to transform their minds. For example, the action verbs "explain, describe and state" are frequently used in the success criteria which would retard critical thinking in the learners, hence would not transform their minds.

Table 2: Summary of document analysis of success criteria in senior secondary school Biology syllabus

Senior secondary school Biology Syllabus content	Success criteria address environmental degradation	Success criteria do not address environmental degradation	
Selected topic related to Environmental degradation	Frequency (f)	Frequency (f)	Total frequency
Ecosystem	2	5	7
Climate change	2	0	2
Ways of mitigating the impact of climate change	2	0	2
Plant structure and its function	1	4	5
Total	7 (44%)	9 (56%)	16 (100%)

Success criteria address environmental degradation= 44% Success criteria do not address environmental degradation =56%

The researcher selected the topics as shown in Table 2 from Senior Secondary School Biology syllabus using purposive sampling technique. This was done in order to select the topics that would help in addressing environmental degradation.

The results in Table 2 which was the summary of document analysis of success criteria showed that 7 success criteria representing 44% of the total frequency of success criteria in sampled topics address environmental degradation, while 9 success criteria representing 56% of the total frequency of success criteria in the sampled topics do not address environmental degradation. Most action verbs that were used in the success criteria do not encourage learners to learn through practice in all different activities, therefore, would not help to transform their minds. For example, the action verb “explain” is frequently used in the success criteria does not promote creativity and critical thinking in the learners, hence would not transform their minds.

To assess how the success criteria in secondary school Biology syllabi are framed to address environmental degradation in Malawi.

From the findings in Tables 1 and 2, most of the success criteria 86% in Junior and 56% in Senior Secondary School Syllabi respectively, do not address environmental degradation. The success criteria of the topics regarding environmental degradation would have addressed the issues of environmental degradation if they were well formulated. Most of the success criteria do not encourage learners to engage in practice, in all different activities related to environmental degradation. Hence would not help to transform their minds. This is quite different from UNESCO (2017), which recommends that success criteria in Biology must allow learners to have more practice and action on what they learn in the classroom situation. According to the findings by

Guo and Lane (2018) in their study in China, recognised that Success criteria in Secondary School Biology must allow learners to have more fieldwork activities, and develop an understanding of the environment. It would be better if Biology syllabi in both Junior and senior levels in Malawi have the success criteria that transform and encourage learners to appreciate and interact with the environment, and address issues relating to environmental degradation.

One of the topics in the Junior syllabus “*Environment*” indicated in Table 1, has no Success criterion that demands learners to practice ways of maintaining the environment. For example, the success criterion “*Students must be able to explain how the components of the environment and the earth are related*”. This success criterion cannot help learners to have a transformative mind in managing or preserving the environment. This means that learners cannot be able to carry out fieldwork activities in addressing environmental degradation. For students to be involved in addressing environmental degradation, it would be better to have a success criterion, “*Students must be able to suggest ways of managing the components of the environment*”. This success criterion would help teachers to prepare lessons which require students to carry out fieldwork activities in addressing environmental degradation such as planting trees and digging pit latrines to manage waste. The managing of the environment would discourage environmental degradation activities such as pollution, deforestation and poaching.

In both Junior and Biology syllabus, the document analysis in table 1 and 2 indicate that most of the topics related to environmental degradation have success criteria with action verbs ‘*explain, describe and state*’ which retard learners to have creativity, critical thinking and transformative ideas. Davies and Summers (2015) state that action verbs such as ‘*explain*’ lead to little learning and retention. This suggests that success criterion with action verb ‘*explain*’ cannot help students address environmental degradation. In Germany, according to Grindsted (2017), the success criteria in the syllabus for secondary school Biology have action verbs which help students to learn by practice or doing. For instance, action verbs like demonstrate, create, apply, design, practice, analyse and evaluate, would help students engage in field activities which address Environmental Degradation. Once learners acquire practical lessons in the classroom situation, they would be able to do such activities when they go back home. Hence, issues of environmental degradation would be addressed accordingly.

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