DESIGN PROJECT AND SKILL DEVELOPMENT IN CHEMISTRY EDUCATION FOR THE ATTAINMENT OF MDGs:
A CASE STUDY OF CHEMISTRY EDUCATION STUDENTS OF F.C.E (T), UMUNZE

BY

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ABSTRACT

This research work is a case study of chemistry education students of Federal College of Education (Technical), Umunze. It was carried out to assess students' perception of design project as a course that enables them to acquire production skills needed for self reliance on graduation. The work also investigated problems students encounter in the execution of design project, possible solutions and factors that could hinder them from setting up their own businesses on graduation. Thirty-three year two students and twenty- four final year students were used. The work was guided by five research questions. Data were collected using questionnaire; data analysis was done using mean and percentage. From the research work, it was found out that design project and other chemistry courses equipped the students with production skills. Lack of financial support from their families, inability to obtain loan from banks and lack of managerial skills are some of the factor that could hinder chemistry education graduates from setting up their own business.

INTRODUCTION

The Millennium Development Goals are eight goals to be achieved by 2015 that respond to the world's main development challenges. The eight goals are drawn from the actions and targets contained in the Millennium Declaration that was adopted by 189 nations and signed by 147 heads of state and governments during the UN Millennium Summit in September, 2000. Nigeria is one of the nations that adopted the Millennium Development Goals (MDGs) and is presently working towards the actualization of the goals. The aim of MDGs is to spur development by improving the social and economic conditions in the world's poorest countries.

The eight Millennium Development Goals have 21 targets and series of measurable indicators for each target. The number one goal is to eradicate extreme poverty and hunger, and one of the targets for this goal is to achieve employment for women, men and young people.

Presently, Nigeria is saddled with the unemployment problem of its populace and this has given rise to poverty and many other social vices, such as robbery, kidnapping, ethnic violence etc. The- unemployment of Nigerian graduates has been blamed on the mode of training they receive in higher institutions. Okeke (2001) observed that the unemployment of many young graduates is due to lack of saleable skills. This could be attributed to the mode of training in higher institutions which lack appropriate practical experiences.

Functional education as it were holds the solution to Nigeria's unemployment problems. In agreement to this, Fagedind and Saha (1998) maintained that education is correlated highly with socio-economic development, the study of life and the whole modernization process. In other words, education of the youth should relate to the world of work. In view of this, Israel and Madichie (2008) maintained that economic emancipation of Nigerians from extreme poverty and unemployment requires revolutionalization in science and technical education in such a way that their output will be graduates that are scientifically and technologically empowered for self-reliance.

Chemistry education is one of the science courses that equip its recipients with scientific knowledge and skill in the area of production of chemical and chemical based products. Design project is one of the courses offered by chemistry education students at NCE level. This project course offers students the opportunity to develop skills in the production of a number of chemicals based products such as soaps, body creams, lotions, toothpaste, candles, paints, pesticides, preservatives etc, by so doing the students are equipped with scientific principles and vocational skills aimed at making them self-reliant on graduation. This research work reviews student's perception of design project as a tool for self-reliance, problems they encounter in the execution of their projects and factors that hinder them from being self-reliant on graduation.

STATEMENT OF PROBLEM

Some of the products students present during their design project defence no doubt conform to market standard in formulation and packaging but some do not. This was also pointed out in the work of Israel (2007). This is an indicator that there are some challenging problems to the realization of the goals of the project work. Again, despite the industrial exposure students receive and the production skills acquired through the course, many of them do not have the confidence to embark on small scale production of chemical products after graduation. This then constitutes another problem. But the

main problem of this study is to determine the level of vocational skills acquired by students during their design project, to determine the problems, if any which hinder them from achieving the goals of the design project.

PURPOSES OF THE STUDY

This research work is carried out to:

i. Assess the level of vocational skills acquired by students through design project.

ii. Find problems hindering student's achievement of the goals of design project.

iii. Suggest ways by which the problem can be solved.

iv. Find out the number of graduating Chemistry education students with the needed vocational skills to be self-reliant.

v. Find the factors that can hinder the graduating students from setting up their own businesses on graduation.

SIGNIFICANCE OF THE STUDY

The findings of this research work will be useful to:

i. The chemistry teachers: They will be exposed to students' area of difficulties in the execution of design project.

ii. The College: The College will be made to know contributions expected of them towards helping .students develop and sustain vocational skills through their design project works.

iii. The Government: Students' area of difficulties in becoming self-reliant on graduation will be highlighted to the government.

RESEARCH QUESTIONS

This study is guided by these five research questions.

1. To what extent do students see design project as a tool for vocationlization in chemistry education?

2. What are the problems militating against students' effective realization of the objectives of design project?
3. What are the solutions to the problems militating against students' effective realization of the objectives of design project?
4. What is the population of graduating chemistry education students equipped with vocational skills needed for self-reliance?
5. What are the problems that can hinder the graduating students from setting up their own businesses?

METHODOLOGY

This research work is a case study of Chemistry Education Students of Federal College of Education (Tech) , Umunze. The population studied consists of 33 year- two chemistry education students who were about to defend their design project work and 24 years, three students who were on the verge of graduating from the department having completed all their courses. No sampling was made as the entire population was used for the study.

INSTRUMENT

Questionnaire was used to collect data for the study. Two questionnaires were prepared and administered separately.

Questionnaire 1 was a 22-item structured questionnaire which sought answers for research questions 1, 2 and 3. This was administered to year two students.

Questionnaire 11 was an 8-item structured questionnaire which sought answers to research questions 4 and 5. This was administered to the graduating students.

VALIDATION OF THE INSTRUMENT

The instrument for data collection was validated by two lecturers in the school of sciences. The corrections and inadequacies of the draft instrument as pointed out by the lecturers were corrected. The final instrument used for the study was thus certified good.

DATA COLLECTION AND ANALYSIS

57 copies of the questionnaire were distributed to the respondents at the College. The same number of copies were completed, returned and used for the analysis, and this represented 100% percent return. Data collected for research questions 1, 2, 3 and 5 were analyzed using mean based on four point scale. Data collected for research question 4 was analyzed using percentage. Any item receiving a mean score rating 3.0 and above was accepted while mean score rating below 3.0 was rejected.

PRESENTATION OF RESULTS

Research Question 1

To what extent do you see design project as a tool for vocalization in chemistry education?

S/N	ITEMS	SA	A	D	SD	N	X	REMARK
	Design project (CHE 313) is a chemistry course that equips one with vocational skills in chemical production.							
1	By enabling one to know many industrial chemicals and their market names.	27	6	-	-	33	3.82	Accepted
2	By giving one the opportunity to interact with small and medium scale manufacturers	14	16	2	1	33	3.30	Accepted
3	The course offers one the opportunity to know many chemical raw materials.	24	8	1		33	3.70	Accepted
4	Through the course one is exposed to many production techniques.	28	3	1	1	33	3.76	Accepted
5	Design project enables one to develop experimental skills such as: weighing	25	6	1		33	3.64	Accepted
6	Volume measurement	25	6	2		33	3.70	Accepted
7	Mixing of chemicals	24	9			33	3.55	Accepted
8	Heating	20	11	2		33	3.55	Accepted
9	Drying	22	9	1		33	3.55	Accepted

10	Observation	23	8	1		33	3.58	Accepted
11	The project enables one to develop entrepreneurial skills	18	11	2	2	33	3.36	Accepted

From table 1. The respondents agreed that design project enabled them to acquire industrial skills, interact with manufacturers, learnt production techniques and chemical raw materials.

Research Question 2

What are the problems militating against students' effective realization of the goals of the design project.

Table 11: Response on problems militating against students; effective realization of the goals of design project

S/N	ITEMS	SA	A	D	SD	N	X	REMARK
12	Insufficient background knowledge of the theoretical concepts of production.	13	14	2	4	33	3.19	Accepted
13	Insufficient background knowledge of production skills	15	9	3	6	33	3.0	Accepted
14	Lack of some of the needed laboratory apparatus in the laboratory	20	7	3	3	33	3.51	Accepted
15	Lack of some of needed chemicals in the laboratory	20	11	1	2	33	3.55	Accepted
16	Insufficient fund for the purchasing of chemicals and equipment needed	18	10	3	2	33	3.33	Accepted
17	Lack of reference materials in the library	24	6	2	1	33	3.61	Accepted

All the items listed on table 11 were accepted as problems militating against students' effective realization of the goals of design project. These include: lack of needed laboratory apparatus and chemicals, insufficient fund on the part of students, lack of needed reference materials etc.

Research Question 3

What are the ways of solving the problems militating against students' effective realization of the goals of design project?

Table 111: Response on the ways of solving problems militating against students' effective realization of the goals of design project

S/N	ITEMS	SA	A	D	SD	N	X	REMARK
18	Students should be given orientation on the course before embarking on the project	25	5	2		33	3.73	Accepted
19	Students should develop the attitude of reading widely on different production concepts	20	12	1		33	3.58	Accepted
20	The library should be stocked with relevant text books on chemical production	28	5	1		33	3.91	Accepted
21	The laboratory should be equipped with most of the needed equipment for production	29	3	1		33	3.85	Accepted
22	Chemical and other consumable materials needed by students should be provided to them by the college	24	6	2	1	33	3.61	Accepted

The respondents accepted all the items on table 111 as ways of solving the' problems militating against effective realization of the goals of design project.

Research Question 4

What is the population of graduating students equipped with vocational skills needed for self-reliance?

Total number of graduating students	Number equipped for self-reliance	%	Number not equipped	%
24	24	100	0	0

From the above table, 100% of the graduating chemistry education students admitted that their exposure to design project and other chemistry courses have equipped them with skills needed for self-reliance on graduation.

Research Question 5

What are the factors that can hinder graduating students from setting up their own businesses on graduation?

Table V: Students' response on factors that can hinder them from setting up their own businesses on graduation

S/N	ITEMS	SA	A	D	SD	N	X	REMARK
1	Need for more industrial experiences	8	13	3	-	24	3.21	Accepted
2	Lack of needed managerial skill	12	10	1	1	24	3.38	Accepted
3	Lack of financial support from the family	13	9	1	1	24	3.42	Accepted
4	Lack of the required collateral to obtain loan from banks	12	8	2	2	24	3.25	Accepted
5	Ignorance of government programmes towards assisting graduates start their own businesses	10	11	3	-	24	2.29	Accepted
6	Fear of taking risk	6	4	3	11	24	2.21	Not Accepted
7	Self-employment takes longer, time to mature, I do not have' the money to sustain myself during the waiting period	9	4	8	3	24	2.80	Not Accepted

The respondents accepted lack of needed managerial skills and industrial experiences, lack of financial support and inability to obtain loan from banks etc as some of the factors that can hinder them from setting up their own businesses on graduation. They did not accept fear of taking risk and longer period needed for business to mature as hindering factors.

DISCUSSION

This research work revealed that design project is a chemistry course that equips its recipients with production skills needed for self-reliance. This is evident in the quality of products students present during their project defence, some of which (as earlier stated) conform to market standard. The research work also revealed a number of problems students encounter in the execution of their project Works. These problems (as contained in table 11) are indications of poor funding of chemistry' education programme. Solutions to the problems as highlighted by the respondents (see table Ill) will require giving the needed orientation to the students, provision of reference materials, laboratory equipment and chemicals. The whole thing hinges on adequate funding of chemistry education programme. To teach chemistry for self-reliance according to Israel and Madichie (2008), the chemistry education programme should be adequately funded to the intent that there will be:

- ✓ Functional chemistry laboratories in our institutions
- ✓ Good maintenance of laboratory equipment, stocking of the laboratories with consumable chemicals on regular basis
- ✓ Provision of relevant textbooks, journals and periodicals in the departmental library.

The research work further revealed that 100% of the graduating chemistry education students accepted that design project and other chemistry courses equipped them with relevant skills needed for self-reliance. They however admitted a number of problems (as indicated in table v) as factors that could hinder them from setting up their own businesses.

There is no doubt that design project and other chemistry education courses taught to chemistry education students enable them to graduate with saleable skills. If the chemistry education programme is properly funded, chemistry courses aimed at developing production skills in the students such as design project, will receive the required attention and the educational objectives will be better achieved. Again if the needed financial and infrastructural environments are created for chemistry graduates, Nigeria will be en route to the solution of unemployment problem of chemistry education graduates.

RECOMMENDATIONS

From the findings of this work, the author recommends as follows:

1. The chemistry education programme should be adequately funded so that the department will be able to provide to the students things needed for the effective execution of their design project and other practical courses.
2. Students should be sensitized through seminars/ workshops of the existence of Government programmes/Agencies targeted at assisting graduates to be self-reliant.
3. The Chemistry Department should be assisted to set-up a consultancy unit where some of the chemical based products such as washing detergents, cream, insecticides, odour control solutions etc can be produced and marketed.
4. Industrial exposure of students through excursions to manufacturing industries should be encouraged.

CONCLUSION

Education for self-reliance is highly needed for the attainment of the number one goal of MDGs. The curriculum of chemistry education programme is loaded with the practical content needed to equip students with skills in the production of chemical based products. All the stakeholders, the government, the college, lecturers and students should intensify effort to ensure the out-put of self-reliant graduates.

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