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The Essence of Setting up Clothing and Textiles Production Units in Zimbabwean Polytechnics.

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Abstract: With the introduction of Competence Based Education and Training (CBET) and the emphasis on Science, Technology, Engineering and Mathematics (STEM) education in polytechnics, it has become imperative that production units be set in tertiary institutions. These concepts assist trainees in acquiring competences and skills that are expected from them as professionals by the industry. The study seeks to assess the importance of setting up Clothing and Textile Production Units in Zimbabwean polytechnics and improve competence and skills attainment and empowerment for productive employment. A survey research design was be used. Simple random sampling was used to select Clothing and Textiles trainees and purposive sampling to select trainers. Structured questionnaires, interviews and observations were used to collect data. Findings revealed that it was important for polytechnics to set up Clothing and Textiles Production Units as they could improve skills and competences of students. The role of Production Units in STEM education was to broaden students' knowledge in Textile Technology and to create a good platform for students to actually apply practically what they have learnt. The major challenges encountered in setting up Clothing and Textile Production Units were shortage of equipment and limited workshop space. The study recommended that Production Unit workshops be separated from the learning facilities, the polytechnics are encouraged to purchase modern and advanced equipment and technology like CAD CAM and regularly service machinery.
Key words: Essence, Production Unit, polytechnic, production system

1. Introduction

Polytechnic education is believed to be the driving force behind industrialisation, socio-economic transformation and sustainable development in a nation. The curricula of Technical and Vocational Education and Training which is imparted to trainees at polytechnics aims at producing artisans, technicians, and technologists in different specialist areas. Clothing and Textile Technology is one of specialist areas that is offered from National Certificate level to Higher National Diploma level at polytechnics in Zimbabwe. The trainee at National Diploma level are expected to go for industrial attachment in local Clothing and Textile manufacturing companies. Industrial attachment intends to expose students to new scientific and technological equipment and how to manipulate them as well as enabling the students to reinforce theoretical instruction through the use of applied learning facilities [1]. Industrial attachment give students an understanding and the basic skills for every stage of production chain, the operation functions of the production process, equipment and production management. However, many clothing and textile manufacturing companies in Zimbabwe have closed shop or down sized due to economic hardships. [2] highlighted that local textile industry is currently in distress with Bulawayo in particular which used to be the major textile centre having many companies either scaled down or closed. Some of the companies that have closed include True Value, Label Fashions, Suntosha Leisure Wear, Luncaster, Harren Manufacturing, Ascot, Belmor Fashions, Cinderella and Rusglen Fashions 91 companies from clothing sector closed down in the second quarter of the year with 25 companies in Bulawayo and 66 clothing companies shutting down in Harare [3]. Among the companies which ceased operations included Asmara Company (Pvt) Ltd and Lancashire Manufacturing. The companies that have down sized most of them are operating at below 30% of capacity owing to an influx of cheap imports of textile products into the country [4]. This then leaves the clothing and textile trainees with a limited chance of getting attachment places at reputable companies.

There are a lot of Small and Micro Enterprises (SMEs) that are coming up in cities and they are mostly the ones that are now taking students on attachment. Most of these companies are very small to the point that they can accommodate only two to four sewing machines and a cutting table. This is not giving the trainees great exposure to the clothing industry set up and practices. It then becomes imperative that polytechnics set clothing production units that will allow trainees to improve skills, competences and industrial practices. A similar study was carried out in Ghanaian Polytechnics by [5] and their findings revealed that some polytechnics in Ghana did

not have clothing production units, and the role of production units was for improving skills and industrial practice, and for acquiring competences.

Polytechnics have moderately adequate equipment to impart skills and competences that are in line with STEM education. In order to bridge the gap between polytechnic education and industry, polytechnics can set up Clothing and Textile Production Units where students and lecturers can participate to broaden the skills and competences. In support of Production Units in tertiary institutions, the Secretary for Higher and Tertiary Education came up with a Pricing and Production Policy Circular of 2011 [6].The policy aims to bring about proper co-ordination and harmonisation of production activities as well as foster public confidence in the services and products from all tertiary education institutions. The production activities should be designed to expose students to hands on practice. The policy further state that all staff and students involved in the Production Services should be paid an allowance for rendering their services to the institution. Both lecturers and students are not only exposed to hands on practices, but also to incentives that accrue from production unit profits.

1.2 Statement of the Problem

Many clothing and textile manufacturing companies in Zimbabwe have closed shop or down sized due to economic hardships. The clothing and textile trainees are left with a limited chance of getting attachment places at reputable companies limiting the exposure to industrial practices. Polytechnics can bridge the gap between polytechnic education and industry. The study sought to assess the importance of setting up Clothing and Textiles Production Units in Zimbabwean polytechnics.

1.3 Research Questions

1.3.1 Why is it important to set up Clothing and Textile Production Units in Zimbabwean polytechnics?
1.3.2 What role do Clothing and Textile Production Units play in STEM education?
1.3.3 What are the challenges that are encountered when setting up Clothing and Textile Production Units?
1.3.4 How can the concept of Clothing and Textile Production Units in polytechnics be improved?

2. Literature Review

2.1 Clothing and Textile Production Units

These are production sections which resemble ideal industry set up that are set out within or outside the clothing and textiles work shops where mass production of clothing and textile items is done. Industrial practices in the clothing sector are replicated as staff and students work on different products after getting orders from the polytechnic, organisations or individuals.

Production Units reinforce Science, Technology, Engineering and Mathematics (STEM) principles while engaging students in real life problem solving, hands-on and relevant learning activities, [7]. There is great use of science when textile materials used to produce the required textile products are analysed through different tests which include fibre identification tests, shrinkage test, abrasion resistance, and colour and sunlight fastness, etc [8]. The advanced use of technology as different industrial equipment, methods and systems are used during production. Engineering of product designs and patterns is also done through use of applied mathematics where accurate measurements, calculations and geometry is relied upon [9]. Product costing is also done for all products produced.

Grading of patterns is done as well as marker making, [10]. Students are exposed to spreading and laying of multiple lays and cutting machines such as straight knife, round knife. During production, straight line/synchronised system, section and progressive bundle systems are used, [11].

2.2 Challenges encountered when setting up Clothing and Textile Production Units.

Polytechnics do not have all of the specialised equipment found in clothing industry, they have the basic equipment. The equipment might not be adequate for Production Unit because there will be three or more groups of students at different levels who would require to use the equipment during training. [1] argues that the industries feel that the students on attachment are not competent in practical aspects, probably as a result of inadequate training due to lack of appropriate equipment, facilities and infrastructure or lack of trained staff to operate and train students on specialised equipment or advanced techniques. The Clothing and Textile curricula is an intensive programme which require a lot of time and therefore students are left with minimum time to participate in production units [12]. Staff and students would work after working hours (1700 hours) and on weekends in order to meet the targets.

In addition there is lack of rigorous marketing of products from polytechnic productions. The production units have limited market. They mainly rely on polytechnic orders especially graduation regalia, corporate and safety clothing for the institution workers and graduates.

3. Methodology

3.1 Research Design

Mixed method research and descriptive survey method was used. Conducting mixed methods research involves collecting, analysing and interpreting quantitative and qualitative data in a single study or a series of studies that investigate the same underlying phenomena [13]. Mixed methods research recognises the fact that the world is not entirely quantitative or qualitative, but rather a mixture of both [14]. The researcher had more than one research questions which require some quantitative and qualitative data to answer them.

3.2 Population

Population refers to a group of individuals that have one or more characteristics in common. [15] and [16] say that population is a large group of people of relevance to the researcher. There are eight (8) polytechnics and two (2) industrial training centres in Zimbabwe. The target population was five polytechnics offering Clothing and Textiles courses from different provinces. National Diploma (ND) students and lecturers in the Clothing and Textile Departments constitute the population.

3.3 Sampling

Ten (10) ND Clothing and Textile students from each polytechnic were randomly selected and one (1) lecturer from each polytechnic was purposively selected from the Head of Department, Lecturer-In-Charge or lecturer responsible for production unit. The sample comprised of fifty (50) ND students and five (5) lecturers giving a total of fifty-five (55) respondents.

3.4 Instrumentation

Instruments are tools or methods which can be used to collect data, such methods include questionnaires, interviews, observation and content analysis [15]. Questionnaire was used to collect data from students, interview guide was used to samples the views of lecturers and observations were made on production unit set ups for different polytechnics.

3.5 Questionnaire

Both closed and open ended questions were used. For closed type of questions respondents chose an answer from the provided alternatives and for the open ended type respondents provided short answers. Fifty (50) questionnaires were prepared and administered to ND Clothing and Textiles students.

3.6 Interview

A face to face meeting between an interviewer and an interviewee [17]. This can be referred to as oral administration of questions to respondents. An interview guide with similar items for the questionnaire was used to interview five (5) lecturers either face to face or through the telephone.

3.7 Data Collection Procedure

Questionnaires were distributed to the students by the researchers and they were collected after thirty minutes. Interviews with lecturers responsible for production units were conducted at the times convenient to them.

3.8 Data Management

Data collected was coded and entered into the computer. Data was presented on tables and figures.

4.1 Data Presentation and Analysis

Findings and discussion were based on the themes which emerged from the research questions.

1. The importance of setting up Clothing and Textile Production Units.
2. The role of Clothing and Textile Production Units play in STEM education.
3. Challenges encountered when setting up Clothing and Textile Production Units.
4. Ways of improving the concept of Clothing and Textile Production Units in polytechnics.

Table 1: Demographic Data

Status	Gender		
	Male	Female	Total
Student	0	50	50
Staff	2	3	5
Total	**2**	**53**	**55**

Table 1 above shows that all the fifty (50) students involved were females. Two (2) of the five (5) lecturers were males.

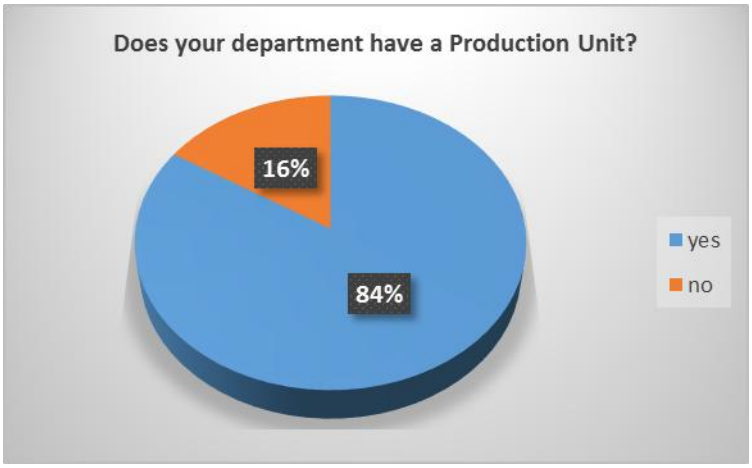

Figure 1: Does your Department have a Production Unit?

Figure 1 shows that 84% said that their Clothing and Textile department had a Production Unit. Only 16% indicated that their department did not have a Production Unit.

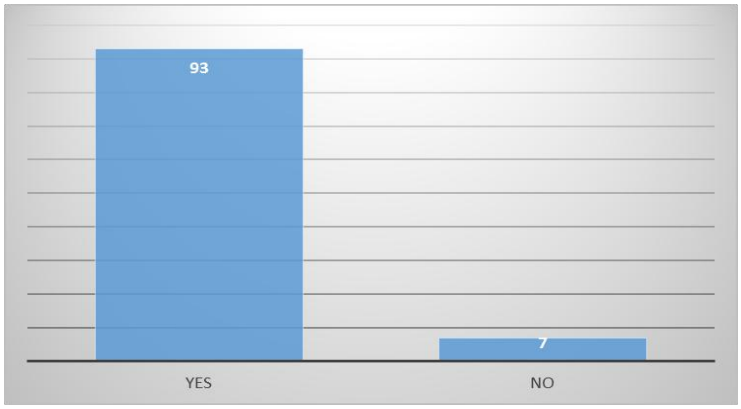

Figure 2: Necessity to set up Production units

93% of the respondents indicated that it was necessary for polytechnics to set up Production Units whereas 7% said it was not necessary.

Table 2: Reasons for setting up Production Units in Polytechnics

	Frequency	Percentage
To improve skills and competencies for students	35	64
To bridge the gap between polytechnic education and industry	12	22
To generate income	8	14
None of the above	0	0
Total	55	100

Table 4 shows that 64% of the respondents indicated that the reason for setting up Clothing and Textiles Production Units was to improve skills and competences for students, while 22% said it was to bridge the gap between polytechnic education and industry. The remaining 14% said it was for income generation.

Table 3: Role of Production Units in STEM education

	Frequency	Percentage
Broadens student knowledge in Textile Technology	15	27
To improve skills and competencies for students	6	11
Allow students to use modern machinery and technology	22	40
No response	12	22
Total	55	100

The findings on table 3 showed that 40% of the respondents assert that the role of Production Units in STEM education was to allow students to use modern machinery and technology, while 27% was of the view that it broadens students' knowledge in Textile Technology.11% said the role of STEM was to improve skills and competences for students and 22% did not respond.

Table 4: Benefits derived from Production Units

	Frequency	Percentage
Improve skills	28	51
Improve speed and accuracy	14	26
Acquire competencies	11	20
Idea sharing	0	0
No response	2	3
Total	55	100

Table 4 showed that 51% of the respondents indicated that benefits derived from Production units included the improvement of skills, whilst 26% said that Production Units it improves speed and accuracy. 20% stated that it helps them to acquire competences and 3% of the respondents did not answer the item.

Table 5: The beneficiaries of Production Units

	Frequency	Percentage
Students	18	33
Lecturers	3	6
Students and lecturers	12	22
The Polytechnic	20	36
No response	2	3
Total	55	100

The findings in table 5 showed that 36% of the respondents indicate that the polytechnic are beneficiaries of Production Units whilst 33% said it was the students who benefited most. 22% indicated that it were the students and lecturers who benefited, 6% said the lecturers alone were the beneficiaries and 3% did not respond to the question.

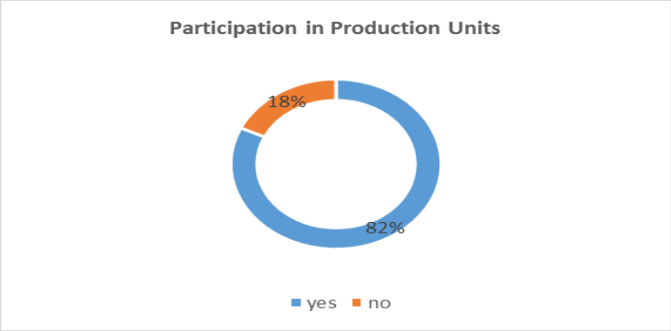

Figure 3: Participation in Production in Units

82% of the respondents indicated that they participated in Production Units at their polytechnics whilst 18% said that they were not involved in Production Units activities.

Table 6: Frequency of participation in Production Units

	Frequency	Percentage
Everyday	5	9
3-4 times a week	1	1
1-2 times a week	22	40
Whenever there is work to be done	21	38
Never	6	12
Total	55	100

Table 6 shows that 40% participated in Production Units at most twice a week, 38% participated whenever there was work to be done.12% participated every day,1% 3-4 times a week and12%indicated that had have never participated in Production Units.

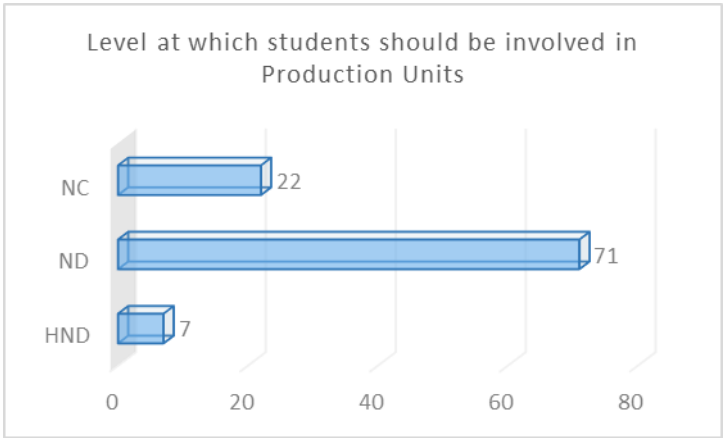

Figure 4: Level on which students should be involved in Production Units

Findings showed that 71% of the respondents said ND students should be involved in Production Units whilst 22% indicated that NC students should be involved. 7% said HND should be involved

Table 7: Set up of Production Units in polytechnics

	Frequency	Percentage
Workshop is separate from learning environment	9	16
Workshop is part of the learning environment	2	4
Workshop is used for both learning and production	44	80
Total	55	100

80% of the respondents indicated that the workshop was used for both learning and production, 16% said workshops were separate from the learning environment and 4% indicated the workshop was part of the learning environment.

Table 8: Suggested ideal set up of Clothing Production Units

	Frequency	Percentage
Workshop should be separated from learning environment	22	40
Workshop should not be separate from learning environment	3	6
Workshop should have modern equipment arranged in systematic order	10	18.
No response	20	36
Total	55	100

Table 8 shows that 40% asserts that the ideal set up of Clothing and Textile Production Units is to separate workshops from the learning environment, whilst 36% did not respond to thequestion.18% said that workshops should have modern equipment arranged in order and 6% said workshops should not be separated from the learning environment.

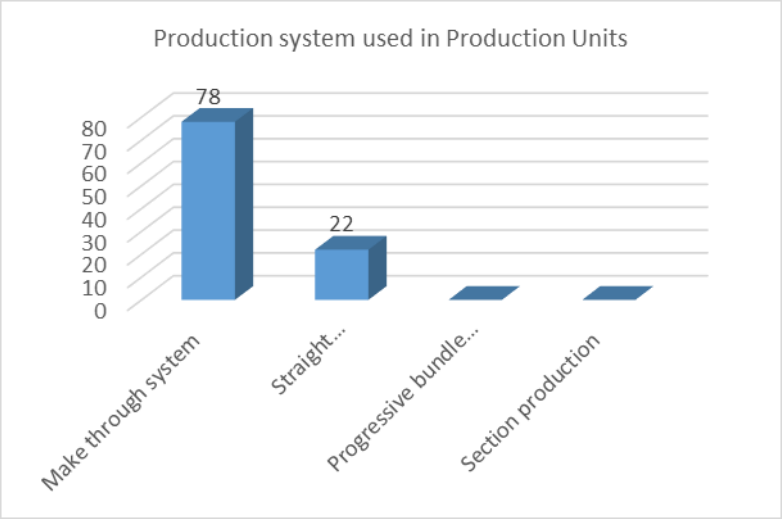

Figure 5: Production systems used in Production Units

78% of the respondents said that the production system used in Production Units was the make through system and 22% said it was the straight line system.

Table 9: Type of equipment found in the Production Units

	Yes		No		Total
	Frequency	Percentage	Frequency	Percentage	%
Domestic sewing machines	22	40	33	60	100
Industrial sewing machines	55	100	0	0	100
Cutting machines	55	100	0	0	100
Fusing machines	13	24	42	76	100
Industrial irons	55	100	0	0	100
Embroidery sewing machine	21	38	34	62	100

Table 9 shows that all the 5 polytechnics had industrial sewing machines, industrial irons and cutting machines.40% had domestic sewing machines, 38% had embroidery machines and 24% of the respondents had fusing machines.

Table 10: Challenges that could be encountered in setting up and running Clothing and Textiles Production Units

	Frequency	Percentage
Shortage of equipment	22	40
Shortage of space	15	28
Lack of corporation from students	4	7
Shortage of capital	5	9
Distribution of profits	5	9
Machine breakdown	4	7
Total	55	100

Findings on table 10 showed that 40% said that a challenge that could be encountered in setting up and running Clothing and Textiles Production units was the shortage of equipment, 28% said it was the shortage of space and 9% said it was the shortage of capital and problems in the distribution of profits. 7% percent said it was due to lack of corporation from students and machine breakdown.

Table 11: Ways that could be used to improve the concept of setting up Clothing Production Units

	Frequency	Percentage
Polytechnic should purchase additional modern equipment	11	20
Separate Production Unit workshop from learning facilities	17	31
Revise production policy on payment of services rendered by students and staff	7	12
Regular servicing of machines	12	22
Use new technology (CAD CAM)	5	9
Allow every student to use specialised machines	3	6
Total	55	100

Table 11 shows that 31% indicate that in order to improve the concept of setting up Clothing and Textile Production Units there should be separate Production Unit workshop from learning facilities, 22% said that there should be regular servicing of machines, 20% indicated that polytechnics should purchase additional modern equipment.12% said the Production Policy on payment of services should be revised, 9% said there should be use of new technology (CAD CAM) and 6% said every student should be allowed to use specialised machinery.

1.4 Discussion of findings

4.4.1 Why is it important to set up Clothing and Textile Production Units in Zimbabwean polytechnics?

The findings revealed that all the five (5) polytechnics offering Clothing and Textile courses had Production Units. The major reason for setting up production units was to improve skills and competences for students [5]. The other reasons were to bridge the gap between polytechnic education and industry and to generate income. This was supported by the Ministry of Higher and Tertiary Education Pricing and Production Policy [6].

4.4.2 What role do Clothing and Textile Production Units play in STEM education?

The study revealed that the role of Production Units in STEM education was to allow students to use modern machinery and technology as well as to broaden student knowledge in Textile Technology, [8] and [9]. Improvement of skills, acquiring competences and improvement of speed and accuracy were states as the benefits derived from Production Units. However the respondents felt that the polytechnic benefited most than students and lecturers.

4.4.3 What are the challenges that are encountered when setting up Clothing and Textile Production Units?

The major challenges that could be encountered in setting up and running Clothing and Textiles Production Units were shortage of equipment and limited space [1]. The other challenges were machinery breakdown and distribution of profits.

4.4.4 How can the concept of Clothing and Textile Production Units in polytechnics be improved?

Findings revealed that the concept of setting up Clothing and Textiles Production Units could be improved by separating Production Unit workshops from learning facilities, purchasing additional modern equipment and regular servicing of machinery.

5.1 Conclusion

The research concluded that it was important to set up Clothing and Textile Production Units in Zimbabwean polytechnics because they improve skills and competencies for Clothing and Textiles students. The role of Clothing and Textile Production Units in STEM education was to improve students' skills and knowledge in Textile Technology and use of modern and advanced machinery and technology. It was concluded that the major challenges faced in setting up Clothing and Textiles Production units in Zimbabwean polytechnics were shortage of machinery, limited space, and machine breakdown.

5.2 Recommendations

The study recommends that:

- Polytechnics should have a separate a Production Unit workshop from learning facilities.
- The machines should be serviced regularly
- Polytechnics should purchase additional specialised modern equipment
- The Production Policy on payment of services rendered by students and staff should be revised
- There should be use of advanced technology (CADCAM).
- Every student should be allowed to use specialised machines.
- Further studies could be done on inclusion of Production activities in the Clothing and Textiles curriculum.

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