Exploring Competency Models and Its Effects on TVET Instructors in Apparel Patternmaking Processes in Ghana

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Abstract

A competency-based TVET system utilises combinations of dominant techniques to ensure that the needs of different industry sectors such as the fashion industry are addressed. In many countries including Ghana, nevertheless, most skills gained during TVET training are too narrow in scope, lack overall context and misses the demand of the labour market. The present study explored competency models and its effects on TVET instructors in apparel pattern making processes in selected Polytechnics offering the fashion design program in Ghana. Both exploratory and descriptive research design was chosen for the study. This study also adopted the quantitative methodology thus questionnaires were the main instruments employed for data collection. The study analysed the opinions of both staff and students. The major empirical findings of the study demonstrate that in CBT, instructors focus their attention on what students have to do and not how they do it. The results also imply that regarding adoption of the different approaches to competency models, the Polytechnics implement competency-based models that are closely aligned with the vision, values and mission which provide broad, quick and consistent impacts.

Keywords: Fashion, apparel, patternmaking, competency models

1. Introduction

The World Bank's (2007) World Development Report stipulates that about 1.3 million people between the ages of 15 to 30 years now live in the developing world. This crop of youth, make up nearly half of the worlds' unemployed population. A report by Silatech (2008) found access to jobs and physical security as the biggest concern for the youth in East Asia and Africa. The report again specifies that developing nations have little time to get this right before the youth dividend transforms into a generation of unemployed adults. As Aring (2011) points out, lack of skills that are valued in global and local economies constrains economic growth, jobs, and income. He points out that, good, demand-driven Technical Vocational Education and Training (TVET) is potentially one of the most valuable tools for skilling the youth, both in and out of school.

However, Aring acknowledges that TVET looks very different in developed nations as compared to the developing ones. According to him, in the developed countries, TVET plays a significant role in preparing people for productive livelihoods. Aring notes that, in addition to the negative social status implied by vocational education, developing countries have few of the conditions found in the developed nations. Instead, most developing countries have little history of collaboration among or between employers and education, and few available resources to purchase and maintain expensive state-of-the-art equipment for learning globally competitive skills.

There is no doubt, therefore, that, the proper development of technical and vocational skills is vital to the fundamental element in the development equation of developing nations as it enables individuals and societies to unlock their potential, extend their horizons and conform to the changes in the dynamic world. In line with this realisation, the underlying philosophy and orientation of Ghana's vision 2020 are to reform the education policy to make it more receptive to the national goals and aspirations as well as local and global demands.

Thus, this strategic direction which centres on human resource development, poverty alleviation, employment creation and accelerated economic growth would be realised through TVET education. To make technical and vocational education, the solution to the socio-economic development of Ghana, many ameliorations in that sector has been introduced. Notable among them is the establishment of the Council for Technical and Vocational Education and Training (COTVET) in 2006. The Council's mandate is to regulate and supervise all aspects of TVET in Ghana. Its establishment has brought about a paradigm shift in the TVET sector as COTVET is embarking on a serious mission to implement Ghana's TVET Reform through the Competency Based Training (CBT) system.

Furthermore, as ADB (2010) specifies, it has repeatedly been stressed that TVET graduates at all levels have to be retrained by employers and that, the instruction currently being rendered in TVET establishments were regarded as exclusively theoretical, and delivered by instructors who do not have the necessary skills or work experience. Reviewing these reports, it becomes vital to train students to the acceptable standards demanded by the world economy to enable quality. Only then can this vicious cycle be interrupted where poorly trained students become poorly qualified vocational teachers, who in turn insufficiently train the new generation of vocational students perpetuating the cycle.

The following statement can summarise the current discussion on vocational education; institutions no

longer adequately fulfil their task as suppliers of relevant skills for the national employment system (Spöttll 2009). Spöttll is of the view that the insufficient organisation, equipment and quality of the current TVET structure threaten the consistency of the system. This he indicates, will have a considerable impact on the social development processes. Modern industries have only little in common with the structures relevant only two decades ago. Customised solutions, products, and services for the particular requirements of the consumers coupled with expected high quality have taken the position of mass production.

These issues call for the qualification and motivation of TVET instructors who should have according to Reich (1993) four core competencies: 'system thinking, abstraction, experimenting, and cooperation' (p. 256). Spöttll (2009) emphasises that this cannot be achieved within an educational system which still 'functions and which is still designed according to a Fordist mass production' (p. 3 & 4). According to him, teachers are still working within strict standards; where institutions are organised based on the division of labour and train their students for the traditional hierarchical structures. Institutions are still rooted in a centralised state hierarchy as they work according to a decreed curriculum. They again adhere to intense atomization of subjects and do not participate in any innovation processes.

To Spöttll, there exist a gap between the need for qualification and the developed qualification profiles. At the moment, most countries are in the middle of an industrial and social transformation leading to a distinct relationship between the educational and the employment systems. The need to alleviate this tension could be made easier by encouraging TVET instructors to be more competent and using competency models when impacting skills in their fields of study. This study thus aims at determining the level of TVET instructors' competency in apparel pattern making processes in selected TEVT institutions offering the fashion design program in Ghana. The study is anticipated to impact significantly on competencies acquired by learners in apparel pattern making processes for the fashion industry. The pattern technology skill is very vital to the development of the fashion industry due to the dynamics of the fashion trade, and this competence is one of the forces that drive the change in the fashion industry and the society at large.

It is, therefore, critical to evaluate the challenges TVET instructors face in imparting these skills to the future generation. These can be achieved by assessing pattern making instructors competencies and finding innovative solutions through the development of suitable skills that can lead to the acquisition of exceptional competencies to facilitate the growth of the fashion industry and also increase the sector's competitiveness both locally and internationally. Specifically, the current study sought to determine in broad terms, the different approaches to competency models evident in the literature and compare with Ghanaian models relative to their strengths and weaknesses and recommend strategies or measures for the improvement of competencies that will help instructors to teach the subject effectively.

2. Literature review
2.1 The role of education in facilitating social and economic progress
The role of education in facilitating social as well as economic advancement has long been acknowledged. Education advances functional and critical capacity and thus unlocks up opportunities for persons and groups to attain greater access to labour markets and livelihoods (Mallman, 2017). A better-educated workforce is crucial if a country is to meet the labour supply requirements of rapid growth. Education is not only a means of improving efficiency but also an effective tool for broadening and augmenting democratic participation and promoting the overall quality of individuals and societal life (Goel 2011; Dede 2010).

Again, as Bünning (2007) notes, education is crucial for the development of people and their contributions to societal growth. It is a vital condition for the ability of modern and democratic society to face the future. Furthermore, Education decides on the innovation and the competitive ability of the economy. In the last decades, the need for skilled labour has increased significantly. The tendency of a rigidly vocation-oriented and functional division of labour to one that is orientated towards processes is not in doubt. TVET institutions, consequently, have the responsibility to develop the vocational flexibility to cope with the changing demands of the world of work and society as pointed out by KMK (2000, cited by Bünning 2007).

Countries all over the world are facing obnoxious challenges such as unemployment, migrations, poverty and starvation. These challenges according to Cheng et al. (2014), cut across both the developed and developing countries. To contain these problems, governments, and the international community is increasingly focusing on efforts to improve the welfare of the youth. Cheng and his colleagues noted that the relative proportion of young people in the world's population is increasing, yet, youth unemployment is high. The increasing numbers of working-age individuals who are not well educated and lack productive skills pose serious challenges to economic development and livelihood empowerment. These challenges have paved the way for the introduction of Competency Models into Technical and Vocational Education and Training (TVET) programs designed to develop the skills of young people and enhance entrepreneurship (Obinnim, & Pong, 2015).

2.2 Origins of CBT in Education

Modern CBT movements began with U.S. efforts to reform teacher education and training in the 1960s (Hodges & Harris 2012; Brown 1994). Brown (1994) described sequential "generations" of CBT and suggested that the models that emerged in the 1980s and early 1990s represented the fifth generation of the competency model. Brown's historical account, widely informed by Australia's CBT vocational education model, traced the development through the first generation which is the application of scientific management to work roles. The second is the development of mastery learning models in the U.S. during the 1920s and 1930s.

Brown suggested that the third generation of CBT approaches was mainly concerned with reflected instructional design and formative vocational education and training informed by psychology – the work of B.F. Skinner – hence the association with behaviourism. The teacher training movement in the U.S. represented the fourth generation, moving beyond vocational training to education. This was when the word "competency" began to be used widely in association with this model of instruction and learning, and when some concepts associated with modern competency-based learning came to the fore. For instance, measurable, behavioural objectives were used to specify what a learner should be able to accomplish and at what level of standards-based performance must follow the training.

Brown further pegged the introduction of sequential instructional design and curricular development to this period. Underlying the transition from one period of CBT approaches to the next is the increased emphasis on outcomes, against process. Brown maintained that "one of the characteristics that have always been linked with CBT is its highly controversial approach to education and training" (p. 11). Jones & Voorhees (2002) reviewed fourth and fifth generation CBT programs, targeting adult learners in the U.S. They discovered that most programs in postsecondary education centred on development and transferability of competency or outcome-based curricula in distinct disciplines and to a lesser degree on specific workplace skills and institutional effectiveness.

Outside of secondary and higher education, the CBT movement also influenced the design and delivery of vocational training in the UK and particularly in Australia, where in the late 1980s and early 1990s, nationwide reforms instituted required that all accredited vocational education and training programs be CBT based (Hodges & Harri 2012). Klein-Collins (2013) also documented the rise of CBT programs in the U.S., noting that, 'An intensive focus on what students know and what they can do rather than on what is taught, for instance, is a hallmark of CBT programs going back at least four decades' (p.4). A unique feature of these initial programs according to Ford (2014), was the emphasis on learning outcomes and assessment of learning outcomes.

Typically, competencies were entrenched in the curriculum, though related advancements in previous learning assessments via portfolios and standardised tests accompanied these efforts. Based on the historical accounts of CBT in the literature, one could reasonably contend that online learning, advances in analytics learning and adaptive technology learning, and the operationalisation of direct assessment models to entire degree programs, signalled an evolutionary shift toward a sixth generation of CBT models. Until recently, CBT programs were primarily a "niche" often targeting the adult learning segment of the higher education market space (Ford 2014).

Recent demands for increased productivity, effectiveness and demonstrable outcomes from the education sector have prompted expanded global interest in the development of major CBT initiatives. As inferred by Klein-Collins (2013), CBT's sharp focus on 'student competencies is designed to validate the quality of the degree, and its technology-based approach to learning has the potential to lower cost' (p. 5). In her first extensive report on CBT programs produced for the Council for Adult and Experiential Learning, Klein-Collins (2012) described what may be considered another distinguishing feature of sixth-generation CBT programs; the increased focus on direct assessment of competencies rather than instructor-led courses.

Although some of the more recently developed CBT programs follow a more traditional approach of positioning CBT frameworks within course-based programs designed around credit hours, others do not. Instead, students earn their qualification by successfully completing a series of project-based assessments that enable them to demonstrate whether they have indeed mastered the stated competencies. Students are assisted, rather than taught, by instructors, who may also be responsible for changing the content that students may need some form of assistance to master a given competency.

2.3 Significance of Competency Based Training Models in TVET

TVET institutions, especially in developing countries, need to provide students with both specialised skills as professionals are highly demanded around the world. Besides the provision of specialised skills, Brown et al. (2008) infer that it must also afford the sort of education that promotes flexibility and innovation to support the constant renewal of economic and social structures relevant to the rapidly developing world.

In this era of creative and adaptable learning, most TVET institutions in developing countries adopt a passive approach to learning where the success of students' in examinations is contingent on their ability to replicate credible portions of their notes from memory (Pongo & Obinnim 2015). Though the curricula and

teaching methods have remained mostly unchanged in developing countries over the past few decades, companies are increasingly demanding analytical thinking, communication and entrepreneurial skills (World Development Report 2007).

2.4 Difference between CBT models and Conventional Training
Foyster (1990), Delker (1990) and Norton (1987) infer that there are some characteristics of CBT models. Key among them are that:

- ❖ Competencies are carefully selected.
- ❖ Supporting theory is incorporated into skill practice, and essential knowledge is learned to help the performance of skills.
- ❖ Detailed training materials are crucial to the competencies needed to be realised and are intended to support the acquisition of knowledge and expertise.
- ❖ Approaches of instruction must include mastery learning.
- ❖ Participants' knowledge and expertise are assessed as they enter the program, and those with adequate knowledge and expertise may bypass education and training or competencies already attained.
- ❖ Learning is individualistic.
- ❖ Flexibility in training approaches including large group methods, small group activities and individual study are essential components.
- ❖ Satisfactory completion of training is based on accomplishment of all stated competencies.

Similarly, Allias (2010) specified that unlike conventional training programs, CBT includes training which is based on competency standards; it is the outcome, and not input, or process focused. It is industry involved or led and flexibly delivered, involving a self-paced approach where appropriate. It is also performance oriented, assessed using criterion-referenced rather than norm-referenced assessment and allows for the recognition of prior learning.

Hiebert & Borgen (2002) points out that the past several decades have witnessed a mismatch in many countries between the skills imparted by education systems and those demanded by the workplace. This mismatch according to them, has been worsened in recent years with the introduction of new technologies in almost every sphere of professional endeavour. Narrowing the disparities between education and work is consequently a priority for most governments because of the possible economic and social benefits to be derived from increasing the proportion of the population that is engaged in productive livelihoods.

Against this backdrop, it is crucial for developing nations such as Ghana to adopt a more innovative view of learning that emphasises active intellectual engagement, participation and discovery, rather than passive absorption and mere recollection of facts. This restructuring necessitates re-design, review and implementation of innovative curricula and academic programs that would change the teaching and learning process. Effective reforms or innovation in TVET institutions in developing countries also requires high-level support from educators, industry, government, prospective students and other stakeholders (Pongo & Adotey 2016). Such innovation must be customised to fit the nation's stage of development, political system, social structure, economic capacities, history and cultural system (OECD 2004).

The pressure to introduce changes in the teaching and learning process have made TVET systems more essential due to reasons such as global economics, industrial restructuring and policy initiatives (OECD 2000; Curtain 2004). In that regard, the development and application of skill standards derived from the curricula of CBT is one primary teaching and learning method that is believed to have a strong potential to increase skill levels, reduce the unemployment rate, increase productivity and to achieve international competitiveness (Smith & Blake 2005).

Though socio-political factors may be the rationale for the introduction of CBT in some countries, the demand for a well-educated and innovative workforce at all professional levels have been a major reason for the introduction of CBT reforms in the VET systems of many countries. Other causes are that training activities in most TVET institutions do not match with the skill needs of the industry as mentioned earlier. It is believed that nations that invest more in high-level skills tend to increase productivity. Intermediate-level skills also address unemployment, while lower level skills reduce social inequities and vices in an economy (Keating 2008). Consequently, most governments and industries have attached much prominence to TVET institutions to provide all levels of skills as a strategy to reduce unemployment, increase productivity and achieve international competitiveness.

A tracer study on the performance of polytechnic graduates in the Ghanaian labour market by Boahin et al. (2010) revealed skills deficiencies in some study programs. These inadequacies have resulted in the migration of graduates, increasing rate of unemployment and graduates undertaking further training after completing their study programs. Most graduates embark on professional training to either learn new skills or improve already acquired skills and knowledge to overcome deficiencies in their skill training. Also, changes in global economy and the desire of firms and industry to reduce the cost of production as a strategy to maximise the bottom-line

have led to incessant modification of their manufacturing processed, marketing strategies and internal systems which do not align with the training systems of TVET institutions.

Considering these realities, innovation in the training system in TVET institutions is needed to bring about distinct teaching methods that will lead to better outcomes and performance of learners. It is as a result of these challenges that in 2006, the Council for Technical and Vocational Education and Training (COTVET) was established among other things to facilitate the initiation of an industry-inspired CBT in the TVET systems in Ghana. The Ministry of Education (MOE) across the country and in collaboration with donor agencies such as the Canadian Development Agency (CIDA) as well as JICA have introduced CBT to improve the quality of TVET in Ghana.

2.5 The Apparel Pattern Making Processes

Pattern making is the process of transforming an apparel item into its constituent flat pattern pieces and then drafting them out. In recent decades, numerous studies have concentrated on computerising the process (see Hinds & McCartney 1993; Ng et al. 1993; Okabe et al. 1992). The work of a pattern maker is to interpret a fashion designer's illustration into sample pattern pieces and draft them out. Pattern pieces represent a piece of garment in sections, and they contain information such as seams, hem allowances, grainline, size, balance marks, placement for buttons, buttonholes, pockets and so on (Kopp et al. 1982). Figure 1 illustrates a typical sample of garment pattern pieces.
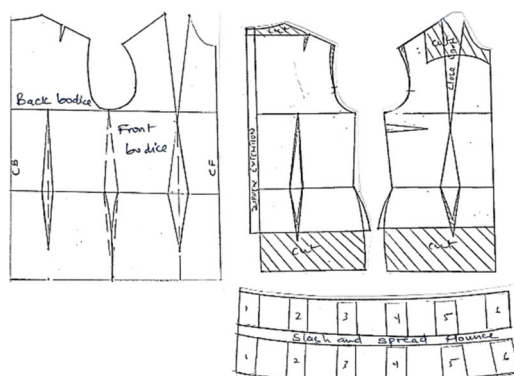

Fig. 1: A sample of garment pattern pieces

The pattern pieces are subsequently sewn together to obtain a garment, a replica of the fashion sketch. This process of interpretation is achieved by applying rules and procedures, collectively known as pattern-making rules, mostly acquired through years of experience. All pattern pieces are modified or derived from their respective basic blocks. A basic block or what is usually referred to in patternmaking as a sloper is a plain, flat, outlined space which represents the respective shape of figure dimensions, for instance, the bodice block, the sleeve block and the skirt block. It has darts to make it fit the bumps and curves of the human figure but has no other fashion features. It is the basis from which the desired pattern pieces are developed (Ladbury 1984). A basic block as Kopp (1984) explains, is usually without seams, as seam allowances can sometimes interfere with proportioning and developing design variations. Most fashion designs are made into garments from these basic blocks.

Different types of garments can have different fashion features. In agreement with the definition of "feature" by Shah (1992), a fashion feature bears the engineering meaning of the geometry of a part of a garment. It is the physical constituent of a garment and can be mapped to a generic shape. It has predictable properties and is of engineering significance. Instances of fashion features in a garment include pleats, darts, design lines (Ladbury 1984). Sleeves in raglan design, sleeves in traditional sketches, long sleeves, short sleeves, collar, flare skirt, zipper fly openings, tapered trousers and so on.

Anything that affects the geometry of a garment is considered a fashion feature. Consequently, a fashion style can be defined as the appearance of a piece of garment obtained after a combination of fashion features have been applied to it. All fashion features either entirely or partially affect the shapes and dimensions of their basic blocks or have markings on the blocks to indicate the positions of the features. They can also give rise to facings and other attachments which in turn translate into additional pattern pieces

Hence, the presence of a fashion feature in a garment design can affect the relevant basic blocks in three ways:
- ❖ It can affect their shapes and physical dimensions.
- ❖ It can create markings on them to locate its positions.
- ❖   It can create additional pattern pieces in its implementation.

Consequently, every single fashion feature in a garment type has its patternmaking rules which specifically states how it affects the drafting of the needed pattern pieces (Kopp 1982).

3. Methodology

The goal of this study was to explore competency models and its effects on TVET instructors in apparel pattern making processes in Ghana. It determined in broad terms, the different approaches to competency models evident in the literature and how these compare with Ghanaian models as well as their strengths and weaknesses and further recommend strategies for the improvement of competencies that will help instructors to teach the subject effectively. In this study, both exploratory and descriptive research design was chosen for the study. A research design according to Cohen et al. (2011) is the overall plan for obtaining answers to the questions being studied and for handling some of the difficulties encountered during the research process.

May (2011) infers that appropriate research design is critical in determining the type of data, the data collection technique, the sampling procedure, the schedule and the budget. This study also adopted the quantitative methodology. Quantitative study as suggested by Sekaran & Bougie (2010) affords accurate statistical data for inference and supports bigger sample sizes which transpose to more generalizability over the population being surveyed. Simillarly, Creswell (2014) specifies that one advantage of the quantitative method is that the results are valid, reliable and generalizable to a more significant population.

The quantitative approach (May 2011) was selected based on the nature of the study and its methodological foundation. In order to keep the investigation within controllable scope, the study was limited to four (4) Polytechnics offering the fashion design program in Ghana. The target study population was thus made up of both staff and students from these Polytechnics. Thus, the purposive sampling technique was employed to select the participants for the study. Zhi (2014), asserts that purposive sampling is suitable when the study intends to glean knowledge from targeted participants deemed to have specific knowledge in the field of study. Thus, 119 samples made up of twelve (12) instructors and one hundred and seven (107) students excluding the first-year students were purposively selected as samples and administered with questionnaires.

The response format was based on a 5-point Likert-scale rating pattern with weightings of Strongly Agree (SA) = 5, Agree (A) = 4, Not Sure (NS) = 3, Disagree =2, Strongly Disagree (SD) = 1. The average of these points is 3.0 (5+4 + 3 + 2 + 1) = 3.0 thus 15/5. This was used in the data analysis. Descriptive data analysis (mean and standard deviation) was used in the analysis. A mean of 3.1 and above indicates agreement with the item (statement) while a mean of 2.99 and below indicates disagreement.

4. Findings

4.1: The approaches to competency models as implemented in the surveyed institutions

Table 1: Approaches to competency models

Item	Frequency (Percent)					μ	$\pm SD$
	1	2	3	4	5		
The models are closely aligned with the vision, values, and mission which provide broad, quick, and consistent impacts - *Core Competency Model (one-size-fits-all model)*	4 (3.4)	-	8 (6.7)	73 (61.3)	33 (27.7)	4.11	.80
The models are built around key course areas and applied to all students - *Functional Competency Model*	-	1 (.8)	18 (15.1)	64 (53.8)	36 (30.3)	4.15	.66
The models are designed to specific roles and identify both core and specific competencies - *Job/Role Competency Model*	-	1 (.8)	19 (16.0)	73 (61.3)	26 (21.8)	4.04	.64
The models are a common set of generic competencies which can be used with several occupations for a longer period - *Multiple-Job Model*	3 (2.5)	12 (10.1)	-	34 (28.6)	70 (58.8)	4.44	.77

Strongly Agree = 5, Agree = 4, Not Sure = 3, Disagree =2, Strongly Disagree = 1
Source: Fieldwork (2018)

Table 1 presents a summary of the responses in relation to the approaches to competency models as implemented in the surveyed institutions. From the responses, it could be observed that more than half 73 (61.3%) of the responses agreed that the models are closely aligned with the vision, values, and mission and provide broad, quick, and consistent impacts. This position was supported by 33 (27.7%) of the respondents who also agreed strongly to that effect. Mean and standard deviation scores (μ=4.11 ±SD=.80) shows that the responses were centred on the agreement point of the scale. The responses infer among other things that the Polytechnics implement competency-based models that are closely aligned with the vision, values, mission which provide broad, quick and consistent impacts.

Concerning the application of Functional Competency Model, the responses indicate that about half 64 (53.8%) of the respondents agreed that the models are built around key course areas and applied to all students. Additionally, 36 (30.3%) of the respondents strongly agreed to that effect. The means scores (μ=4.15 ±SD=.66) shows that the majority of the responses were directed towards the agreement side of the scale. The results imply that the Polytechnics adopt the Functional Competency Model where models are designed around key course areas and applied to all students.

More so, in implementing Job/Role competency model in the surveyed institutions, a summary of the responses demonstrates more than half 73 (61.3%) of the respondents agreed to the effect that competency-based models are designed to specific roles which identify both core and specific competencies. Also, 26 (21.8%) of the respondents agreed strongly to that effect. Mean and standard deviation scores (μ=4.04, ±SD=.64) obtained indicates that the majority of the responses were centred on the agreement end of the scale. By implication, the results specify that Polytechnics in Ghana implement the Job/Role Competency Model where instruction is designed to specific roles to identify both core and specific competencies.

Furthermore, considering the implementation of the Multiple-Job Model; the results show that the majority 70 (58.8%) of the respondents strongly agreed that the models are a common set of generic competencies which can be used with several occupations for a longer period. That notwithstanding, 34 (28.6%) of the respondents also agreed in that regard. Mean, and standard deviation scores (μ=4.44, ±SD=.77) illustrates that most of the responses were towards the agreement end of the scale. The results suggest that the Polytechnics surveyed combine more than one competency preferably a common set of generic competencies which can be used with several occupations for a longer period.

4.2 How the various institutions surveyed organise their apparel pattern making processes
Table 2: Apparel pattern making processes

Item	Frequency (Percent)					μ	±SD
	1	**2**	**3**	**4**	**5**	**μ**	**±SD**
To transform three-dimensional (3D) fashion designs into two-dimensional (2D) constituent pattern pieces	6 (5.0)	7 (5.9)	2 (1.7)	74 (62.2)	30 (25.2)	3.97	.98
To identify the type of garment, the features of the design and the locations of these features on the apparel	8 (6.7)	10 (8.4)	4 (3.4)	27 (22.7)	70 (58.8)	4.18	1.24
Pattern pieces are flat, irregular shapes that represent a piece of garment in sections	9 (7.6)	11 (9.2)	11 (9.2)	30 (25.2)	58 (48.7)	3.98	1.28
In order to obtain a working garment, the pattern-making process needs to be continuously iterated through three steps: fashion analysis, pattern design and pattern drafting	7 (5.9)	13 (10.9)	20 (16.8)	26 (21.8)	53 (44.5)	3.88	.13
The iterations if not well made can result in changes to the design	-	-	4 (3.4)	21 (17.6)	94 (79.0)	4.76	.50

1=not at all, 2=small extent, 3=some extent, 4=large extent, 5=very large extent
Source: Fieldwork (2018)

Table 2 presents responses regarding a series of questions concerning how the various institutions surveyed organise their apparel pattern making processes. Respondents were asked whether they are able to transform three-dimensional (3D) fashion designs into two-dimensional (2D) constituent pattern pieces. Summary of the responses shows that more than half 74 (62.2%) of the respondents said they could transform three-dimensional (3D) fashion designs into two-dimensional (2D) constituent pattern pieces. Also, 30 (25.2%) of the respondents responded that to a very large extent they were able to transform 3D fashion designs into 2D constituent pattern pieces. Mean, and standard deviation scores (μ=3.97, ±SD=.98) shows that the majority of the respondents are able to a large extent transform three-dimensional (3D) fashion designs into two-dimensional (2D) constituent pattern piece. The results indicate that Polytechnic students can transform three-dimensional (3D) fashion designs into two-dimensional (2D) constituent pattern pieces.

Furthermore, on respondent's ability to identify the type of garment, the features of the design and the locations of these features on the apparel; it could be observed from the results that more than half 70 (58.8%) of the respondents stated they are able to identify the garments, features of the design and also the locations of these features on the apparel. Also, 27 (22.7%) of the respondents responded they are to a large extent able to undertake the process. Mean and standard deviation scores (μ=4.18, ±SD=1.24) confirms that most of the respondents are to a large extent able to undertake the process. The results suggest that Polytechnic students can identify the type of garment, the feature of the design as well as the locations of these features on the apparel. More so, the results demonstrate that nearly half 58 (48.7%) of the respondents agreed to a very large extent that

pattern pieces are flat, irregular shapes that represent a piece of garment in sections.

Likewise, 30 (25.2%) of the respondents agreed that to a large extent, pattern pieces are flat, irregular and comes in shapes that represent a piece of garments in sections. Mean scores and standard deviation (μ=3.98, ±SD=1.28) confirms that the majority of the responses were around the 'large extent' side of the scale. The results imply that the students agreed that pattern pieces are flat, irregular and come in shapes that represent a piece of garments in sections.

Moreover, the majority 53 (44.5%) of respondents further agreed to a very large extent that to obtain a working garment; the pattern-making process needs to be continuously iterated through three steps: fashion analysis, pattern design and pattern drafting. Additionally, 26 (21.8%) of the respondents also agreed to a large extent in that regard. Mean, and standard deviation (μ=3.88, ±SD=.13) showed that the majority of the responses were geared towards the large extent end of the rating scale. This outcome suggests that students are aware of the fact that to obtain a working garment, the pattern-making process needs to be continuously iterated through three steps: fashion analysis, pattern design and pattern drafting.

Again, from table 4.4 it can be observed that more than two-thirds 94 (79%) of the respondents admitted to a very large extent that iterations in the apparel-making process if not well made can result in changes to the design. Nevertheless, 21 (17.6%) of the respondents accepted to a large extent that iterations if not well made can result in changes to the design. Mean scores and standard deviation values (μ=3.88, ±SD=.13) attests that the majority of the responses were moving towards to a very large extent side of the rating scale.

4.3 The desired competencies needed for effective delivery of teaching and learning
Table 3: Desired competencies needed

Item	Frequency (Percent)					μ	$\pm SD$
	1	2	3	4	5		
Design and execute developmentally relevant and challenging learning experiences.	6 (5.0)	14 (11.8)	-	76 (63.9)	23 (19.3)	3.81	1.04
Create learning experiences that are meaningful to assure mastery of the content.	7 (5.9)	11 (9.2)	2 (1.7)	60 (50.4)	39 (32.8)	3.95	1.12
Use multiple methods of assessment to engage and monitor student's progress.	5 (4.2)	15 (12.6)	1 (0.8)	51 (42.9)	47 (39.5)	4.01	1.14
Ensure inclusive training settings that allow each learner to reach higher standards.	10 (8.4)	11 (9.2)	5 (4.2)	47 (39.5)	45 (37.8)	3.90	1.25
Connect concepts and apply different perspectives to engage learners in analytical thinking, creativity, and collaborative problem-solving.	6 (5.0)	8 (6.7)	5 (4.2)	67 (56.3)	33 (27.7)	3.95	1.02
Plan instruction that supports student in meeting rigorous learning goals.	10 (8.4)	18 (15.1)	-	62 (52.1)	29 (24.4)	3.69	1.23
Work with others to generate situations that support individual and collaborative learning,	7 (5.9)	15 (12.6)	1 (0.8)	56 (47.1)	40 (33.6)	3.90	1.18
Use a diversity of instructional strategies	5 (4.2)	15 (12)	3 (2.5)	37 (31.1)	59 (49.6)	4.09	1.17

Strongly Agree = 5, Agree = 4, Not Sure = 3, Disagree =2, Strongly Disagree = 1
Source: Fieldwork (2016)

The results in Table 3 concerns a series of questions on the desired competencies needed for effective delivery of teaching and learning. The responses in relation to the design and implementation of developmentally appropriate and challenging learning experiences show that the majority 76 (63.9%) of the respondents agreed to that effect. Likewise, 23 (19.3%) of the respondents also agreed strongly. Mean score and standard deviation values (μ=3.81, ±SD=1.04) demonstrates that the majority of the responses pointed towards the agreement side of the scale. The results, however, implies that instructor in Polytechnics design and implement developmentally appropriate and challenging learning experiences.

Again, the respondents were requested to indicate whether their instructors create learning experiences that are meaningful to assure mastery of the content. It could be observed from the responses that just about half 60 (50.4%) of the respondents agreed that their instructors create for them meaningful learning experiences that assure mastery of the content whereas 39 (32.8%) of the respondents also agreed strongly to that effect. Mean, and standard deviation scores (μ=4.18, ±=1.24) shows that the majority of the responses were to the agreement end of the scale.

Furthermore, responses to instructors use of multiple methods of assessment to engage and monitor student's progress, and outcome indicates that about 51 (52.9%) of the respondents agreed with the assertion that their instructors adopt multiple methods of assessment to engage and monitor their progress. This position was

supported by 47 (39.5%) of the respondents who also agreed strongly to that effect. Mean and standard deviation scores (μ=4.01, ±SD=1.14) affirms the general trend of responses which were geared towards the agreement side of the scale. The outcome implies that instructors in the Polytechnic implement multiple methods of assessments to engage and monitor the progress of students.

Regarding responses to whether instructors ensure an inclusive learning environment that enables each learner to meet high standards, the responses to that effect in Table 3 shows that the trend of responses was geared towards the agreement end of the scale. Where the majority 47 (39.5%) of the respondents agreed with 45 (37.8%) of the respondents also agreeing strongly. The general direction of the responses suggests that fashion instructors at the Polytechnic surveyed ensure that there is inclusive learning in which the environment is created for each learner to be able to meet high standards of achievements.

That notwithstanding, responses regarding fashion instructor's ability to connect concepts and also apply different perspectives to engage learners in analytical thinking, creativity, and collaborative problem solving indicated that about half (67 (56.3%) of the respondents agreed to that effect. Additionally, 29 (24.4%) of the respondents also supported this position. The mean and standard deviation (μ=3.95, ±SD=1.02) values affirm that the responses are trended in the area of agreement with the assertion being made. The results mean that fashion instructors do well to find connections in concepts they teach while implementing differing perspectives to engage learners in critical thinking, creativity and collaborative problem-solving.

Again, the respondents were asked to indicate the extent of their agreement or otherwise with the notion that their instructors plan instruction that supports students in meeting rigorous learning goals. The responses show that about half 62 (52.1%) of the respondents stated they agree with that assertion whereas 29 (24.4%) of the respondents indicated they strongly agree with that claim also. Mean and standard deviation scores (μ=3.69, ±SD=1.23) suggest that the majority of the responses were centred around the agreement end of the scale. The outcome of the responses gives the impression that fashion instructors at the polytechnics plan instruction to effectively enable students to meet the demands of achieving learning goals.

On the subject of instructors working with others to create environments that support individual and collaborative learning, the responses to that effect point out that close to half 56 (47.1%) of the respondents agreed whereas 40 (33.6%) of the respondents also expressed their strongest of agreement with same. Mean and standard deviation scores for the question revealed that the responses are generally trended towards the agreement end of the scale. That notwithstanding, the results mean that fashion instructors at the various Polytechnics surveyed make an effort to work with others to create the enabling environment to support individual student learning and collaboratively as well.

With instructors employing diversified instructional strategies to facilitate student learning, the responses to that effect shows that approximately half 59 (49.6%) of the respondents strongly agreed whereas 37 (31.1%) of the respondents also agreeing strongly to the effect that their instructors adopt diversified instructional strategies to facilitate student's learning. Again, responses are geared towards the agreement end of the rating scale suggesting that instructors use instructional strategies that offer multiple implications and benefits in facilitating students learning.

5. Discussion

5.1 The different approaches to competency models as practice in Ghanaian

In Ghanaian Polytechnics, presently, the findings suggest that different approaches to competency models are implemented. It was discovered among other things that Polytechnics implement competency-based models that are closely aligned with the vision, values and mission which provide broad, quick and consistent impacts on students' skills. The results also indicate that the Polytechnics adopt the Functional Competency Model where models are designed around key course areas and applied to all students. Again, Polytechnics in Ghana implement the Job/Role Competency Model where instruction is designed to specific roles to identify both core and specific competencies. Additionally, it was discovered that the Polytechnics surveyed combine more than one competency preferably a standard set of generic competencies which can be used with several occupations for a more extended period.

5.2 Strategies appropriate for instructors to be able to teach the pattern making effectively

It was discovered from the findings relative to the strategies instructors need to be able to teach the pattern making effectively that, Polytechnics surveyed have sufficient teaching and learning resources for effective academic work. Besides, fashion instructors at the Polytechnics do not demonstrate irrelevant teaching competencies in their respective lecture rooms. Nonetheless, fashion instructors possess adequate industrial exposure as well as working experience needed to teach effectively. However, poor entry qualification of students into the respective Polytechnics does not affect the effective implementation of competency-based models in the institutions.

The findings from the study indicate that Polytechnics' in adopting the competency-based model to

teaching, adopt different roles and responsibilities to augment student learning. Most of the instructors have now tailored their instructional methods to one that is student-oriented and focused. In relation to how CBT is carried out, it was discovered that competencies to be achieved by students are derived from occupational standards and are updated continuously to reflect changing needs.

Today, many internationally acclaimed fashion designers create original products utilising inspiration from various historical and contemporary sources. Friggs (2008) buttresses this point by affirming that, the majority of apparel designers develop new products of different types in accordance with the trends established by the leading international designers. Findings from the study revealed that there are three (3) techniques that are the key to the success of a design concept that finally leads to the construction of the apparel. These are draping, flat pattern making, and Computer Aided Design (CAD) technique. Hence, the need to master all these techniques to be able to teach the pattern making course effectively. However, specifically, apparel pattern instructors need to observe and undertake the following:

❖ *Instructional Systems:* Patternmaking instructors must think systemically about instruction. Systems are made up of relationships, processes, conditions, effects, causes and feedback. To identify a system, they must demarcate where one system ends, and another begins. In education, and specifically in pattern making, there is the need to determine and focus on the instructional system. Most times, instructors make the mistake of identifying an instructional system at the peril of ignoring other systems. Apparel pattern making instructors need to appreciate what is involved in the process of instruction and what the essential components of instruction are. Most of the time, instructional systems include decisions related to what will be taught, how it will be prearranged, and how learning will be assessed. For analytical purposes, it is essential to identify what both students and instructors do within the system. It is essential to address individual components of the system (Petrina 2007).

❖ *Instructional design:* Patternmaking instructors must learn to design their instruction appropriately. The instructional design procedure integrates the theoretical reflections into a practice-based context that bridges the gaps between student requirements, learning aims, delivery of instruction, as well as evaluation. Smith & Ragan (1993) corroborate this assertion when the specified that, instructional design can as a systematic process, translates principles of learning and instruction into plans for instructional materials and activities. The procedure replicates the facets of adult learning, plus its dependence on the perspective of the student, instead of the content, to guide instruction. (Kemp et al. 2004). This is a deviation from the more traditional educational approach in which content is identified and presented, often without first evaluating students' needs and abilities.

6. Conclusion

In order to ensure that the impact of competency models in TVET instructors in apparel pattern making processes are relevant to the needs of students and the industry, there is a need to equip them with industrial experience according to their explicit requirements. Strengthening linkages with the industries during the initial instructor training is required, with particular emphasis on the unique nature of pattern making and the realities of the world of work, and with less emphasis on the attaining higher academic degrees. A programme that is more relevant and applicable to knowledge and skills in terms of shifting technology and working practices. In appreciating the significance of the industrial experience, Lipsmeier (2013) emphasised the importance of industrial experience for all TVET instructors.

Again, in order to be up-to-date with the rapidly changing technology, there is the need also, to revise and develop the competencies of apparel pattern making instructor's training to be more receptive to the current trends of TVET and different industry demands. In addition to practical and hands-on industrial exposure of TVET instructors, there is also the necessity for regular staff capacity building. There is the need for the provision of training programmes for the improvement and upgrading of instructional aids and materials, taking into account the provision of sufficient and up-to-date equipment and facilities according to the training needs of fashion workshops and laboratories.

References

ADB, (2010). Labor Market Assessment: Strengthening Technical and Vocational Education and Training Project. http://www2.adb.org/Documents/RRPs/LAO/42278/42278-02-lao-oth-01.pdf.

Allais, S. (2010). The implementation and impact of National Qualification Framework: report of a study in 16 countries. Geneva: International Labour Office.

Aring, M. (2011). Technical and Vocational Education and Training: A Study of Promising Models in International Development. The United States.

Boahin, P., Kamphorst, J. C. & Hofman. W. H. A. (2010). Tracer study on the performance of polytechnic graduates in Ghanaian labour market. Accra, Ghana.

Boyatzis, R. E. (2008). Competencies in the 21st century. *Journal of Management Development*, 27(1), 5–12.

Brown, M., (1994). A Collection of Readings Related to Competency Based Training. Victoria: Deakam University.

Brown, P., Lauder, H. & Ashton, D. (2008). Education, Globalisation and the Future of the Knowledge Economy. *Europeans Educational Research Journal*, 7 (2), 131-156.

Bunning, F. (2007). Approaches to Action Learning in Technical and Vocational Education and Training (TVET) *Journal of Sociology,* 53(1), 18–31.

Bünning, F., Gleißner, K. Jing, M. & Yang, S. (2011). Initiatives to foster Chinese TVET and TVET Teacher Training. Magdeburg, Germany: UNVEOC Centre.

Cheng, N. I., Rigobert, P. M., Akofu, A. A. & Mbah, O. P. (2014). Public versus Private Sector   Interventions for Technical and Vocational Training: A Systematic Review. Campbell Systematic Reviews, pp. 1-11. http://www.campbellcollaboration.org/lib/project/343/

Cohen, L., Manion, L., & Morrison, K. (2011). Research Methods in Education 7th (ed.). New York: Routledge.

COTVET (2009). Report of the Technical Committee on the Harmonisation of Competency-Based Training (CBT) in Ghana. Ghana: COTVET.

COTVET (2010). TVET Reforms Proposals. Accra- Ghana: Council for Technical, Vocational Education and Training.

Creswell, R. (2014). Research design: qualitative, quantitative, and mixed methods approaches. USA: Sage Publications.

Curtain, R. (2004). Vocational educational and Training, innovation and globalisation. Adelaide: National Centre for Vocational Education Research (NCVER). del Bueno, D. J. (1978). Competency-Based Education. *Nurse Educator*, 3(3), pp. 10 -14.

Dede, C. (2010). Comparing frameworks for 21st-century skills. 21St Century Skills, 51–76.

Delker, P. V. (1990). Basic Skills Education in Business and Industry: Factors for Success or Failure. Contractor Report, Office of Technology Assessment, United States Congress.

Ford, K. (2014). Competency-Based Education: History, Opportunities, and Challenges. Turin: UNESCO.

Foyster, J. (1990). Getting to Grips with Competency-Based Training and Assessment. TAFE National Centre for Research and Development. Australia: Leabrook.

Friggs, G. (2008). Fashion from concept to consumer (9th ed.). New Jersey: Prentice Hall Education, Inc.

Goel, V. P. (2011). Technical and Vocational Education and Training (TVET) System\in India for Sustainable Development. India: Ministry of Human Resource Development, Department of Education.

Grootings, P. & Nielsen, S. (Eds). (2005). ETF Yearbook 2005-Teachers and trainers: Professionals and stakeholders in the reform of vocational education and training. Turin: European Training Foundation.

Hiebert, B. & Borgen, W. (Eds.) (2002). Technical and Vocational Education Technical and Vocational Education and Training in the Twenty-First Century - New Roles and Challenges for Guidance and Counselling. Education and Training. UNESCO.

Hinds, B. K. & McCartney, J., (1993). Three-dimensional design of garments and automated pattern production. The Application of Computers to Manufacturing Engineering (ACME) Directorate, Science and Engineering Research Council, Research Conference Proceedings, Sheffield University, Sheffield, pp. 2-7.

Hodge, S. & Harris, R. (2012). Discipline, governmentality and 25 years of competency-based training. *Studies in the Education of Adults*, 44(2), pp. 155-170.

Jones, E. A. & Voorhees, R. A. (2002). Defining and assessing learning: Exploring competency-based Group on Competency-Based Initiatives in Postsecondary Education. Brochure and Report. ERIC. http://files.eric.ed.gov/fulltext/ED473245.pdf

Keating, J. (2008). Current Vocational Education and Training Strategies and Responsiveness to   Emerging Skills Shortages, A Well-skilled Future –Tailoring VET to the Emerging Labour   Market,   Adelaide. NCVER.

Kemp, J. E., Morrison, G. R. & Ross, S. M. (2004). Designing effective instruction. Hoboken: John Wiley & Sons.

Klein-Collins, R. (2012). Competency-based degree programs in the US. Council for Adult and Experiential Learning. http://www.cael.org/pdfs/2012_CompetencyBasedPrograms.pdf

Kopp E., Rolfo, V., Zelin, B. & Gross, L., (1984). How to Draft Basic Patterns. New York: Fairchild Publications.

Kopp, E., Rolfo, V., Zelin, B. & Gross, L., (1982). Designing Apparel through the Flat Pattern, Fairchild Publications, New York, NY.

Ladbury, A. (1989). Complete Pattern Designing, Sidgwick & Jackson, London.

Lipsmeier, A. (2013). Approaches towards enhanced Praxis-Orientation in Vocational Teacher Education. A paper presented during Regional Conference on Vocational Teacher Education. Tongji University, Shanghai, China, 24-25 October 2013.

Mallman, M. (2017). Not entirely at home: Upward social mobility and early family life.

May, T. (2011). Social Research: Issues, Methods and Research. McGraw-Hill May, T., 2011. Social research. McGraw-Hill Education (UK).

Ng, R., Chan, C. K., Au, R. & Pong, T. Y. (1993). Computational technique for 3-D pattern design. Textile Asia, Sheffield, pp. 62-4.

Norton, R. E. (1987). Competency-Based Education and Training: A Humanistic and Realistic Approach to Technical and Vocational Instruction. Paper presented at the Regional Workshop on Technical/Vocational Teacher Training in Chiba City, Japan.

Obinnim, E. & Pongo, N. A. (2015). The Significance of Flat Pattern Making in Fashion Designing. *International Journal of Innovative Research in Science, Engineering and Technology*. 4(4), 1850 –1857.

OECD. (2004). Innovation in the Knowledge Economy, Paris: OECD.

OECD. (Organisation of Economic Co-operation and Development). (2000). A new economy? The changing role of innovation and information technology in growth. OECD, Paris,

Okabe, H., Imaoka, H., Tomika, T. & Niwaya, H. (1992). Three-dimensional apparel CAD system. *Computer Graphics*, 26(2), pp. 105-10.

Petrina, S. (2007). Advanced Teaching Methods for the Technology Classroom. USA: Information Science Publishing.

Pongo N. A. & Obinnim, E. (2015). Changing Landscape of Industry Practice: The Role of Quality Technical Vocational Education and Training in Ghana. *Arts and Design Studies*, Vol. 33, pp. 1 – 8.

Pongo, N. A & Adotey, J. (2016). The Impact of Excellence Concepts on Fashion Students in Ghanaian Higher Education. *International Journal of Innovative Research & Development,* 5(13), pp. 100-107.

Reich, R. B. (1993). The Work of Nations: Preparing Ourselves for 21st. Century Capitalism.   London; Simon and Schuster.

Review of Psychological Foundations and Selected Teaching Concepts of Action Learning. Germany: In WEnt Capacity Building International.

Sekaran, U. & Bougie, R. (2010). Research methods for business: a skill-building approach, 5th edn, Wiley, Chichester.

Shah, J.J. (1992). Features in design and manufacturing. In Kusiak, A. (Ed.), Intelligent Design and Manufacturing. New York: John Wiley & Sons.

Silatech. 2008. http://www.silatech.com/arabic/media/pdf/Silatech%20Brief.pdf

Smith, P. & Blake, D. (2005). Facilitating learning through effective teaching. Adelaide: NCVER.

Smith, P. L. & Ragan, J. (1993). Instructional design. Upper Saddle River (NJ): Prentice-Hall.

Spöttll, G., (2009). Teacher education for TVET in Europe and Asia: The comprehensive requirements. *Journal of Technical Education and Training*, 1(1), p.1-16.

World Bank. World Development Report, 2007.

Zhi., H. L. (2014). A comparison of convenience sampling and purposive sampling. *PubMe*d, 105-11.