

African Journal of Education and Practice (AJEP)

EFFECTIVENESS OF TRANSFORMATIVE LEARNING EXPERIENCES ON EMPLOYABILITY OF BACHELOR OF TECHNOLOGY PROGRAMME GRADUATES OF TECHNICAL UNIVERSITY OF KENYA

Dr. Gaudencia Achieng' Ndeda, Dr. Paschal Wambiya and Prof.
Mary N. Getui

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¹Dr. Gaudencia Achieng' Ndeda

Lecturer: Faculty of Social Sciences and Technology: Technical University of Kenya
Corresponding Author E-mail: gaudencia.ndeda@gmail.com

²Dr. Paschal Wambiya

Senior Lecturer: The Catholic University of Eastern Africa

³Prof. Mary N. Getui

Professor: The Catholic University of Eastern Africa

Abstract

Purpose: This study sought to examine the effectiveness of transformative learning experiences on the employability of Bachelor of Technology Programme graduates of Technical University of Kenya.

Methodology: The study used sequential explanatory design of the mixed method approach. Target population was 231 B. Tech graduates of the 2011, 2012 and 2013 cohorts all of which were included in the sample since they had limited numbers. Data were collected using a questionnaire and an interview guide. Reliability and validity index was calculated at between 0.8 and 0.9, an indication that the instruments were valid and reliable. The quantitative instrument was administered first and analysed, and the results used to construct the interview guide that was later conducted for explanatory purposes to validate the outcomes of the quantitative phase. The Perspective Transformation Index (PT-Index) on a scale of 1-3 was used. Responses were coded using Statistical Package for Social Sciences (SPSS) software for windows version 21.0 and presented using tables and figures.

Findings: The majority (67.3%) of the B. Tech graduates experienced transformative learning. 71% of these attributed the transformation to the learning activities in the B.Tech programme (PT3) and 16.3% to factors outside the B.Tech programme (PT2). Mentoring 85%, group project 58%, class presentation 46%, industry-based learning and trips 47%, class discussion and dialogue 47%, term papers and essays, self-evaluation, class activities and exercises, laboratory experiences and assigned readings all scored above 20%. Critical and creative thinking, and personal-self-reflection scored below 20%. New computers 37%, new technology support in the office 46%, new leadership 13%, new professional requirements 43%, emerging unfamiliar work dimensions 16%, rapid transformation in Technology 45%, transformation in social life 27% and a feeling of incompetence 12%.

Unique contribution: Theory: Transformative Learning can enhance employability of B.Tech graduates. **Practice:** The findings will inform design, implementation and improvement of academic curricula and training processes in institutions of higher learning. **Policy:** The findings can inform policy on transformative learning for greater employability.

Key Words: *Bachelor of Technology Programme, transformative learning, perspective transformation, TVET, employability*

1.0 INTRODUCTION

Worldwide, Technical Vocational Education and Training (TVET) is the major connecting link between the school system and the employment market, meaning that developments in TVET are intimately linked to general trends in the economy. Consequently, TVET programmes have recently received increased attention as an area of priority for stimulating growth in developed and developing countries. The World Bank, International Labour Organization (ILO), United Nations Educational, Scientific and Cultural Organization (UNESCO), and other international and local organizations have also outlined the contribution of TVET towards economic and social developments. Boodhai (2010) posits that the contribution of a well-structured TVET system has led countries such as Canada, Australia, Germany, Singapore, and Japan to become global leaders in technology in a noticeably short time. Evidence from Asian Countries indicates that TVET training is an essential part of industrial productivity. A causality analysis on the impacts of TVET programmes on the Turkish industrial production index for the period of 1975-2007, by Ozsagir, 2010, found out that a direct and positive relationship exists between TVET and industrial production index. A review on the impact of human capital on economic growth in European Union (EU) Member States, Wilson & Briscoe. (2004), also revealed that an increased investment in TVET programmes lead to higher productivity and earnings for the individual as well as enhanced social rates of return.

African Union (AU) Plan of Action for the Second Decade of Education (2006 – 2015), recognizes the importance and emphasizes the need for quality and relevance in TVET programmes as a means of empowering individuals to take control of their lives. A survey conducted by the AU on the state of TVET in 18 African countries points TVET sector as a priority area for vocational training in Africa (African Union, 2007). In Botswana, studies reveal a positive and significant relationship between economic growth and TVET, (Mupimpila, & Narayana, 2009). The Organization for Economic Cooperation and Development (OECD) countries developed a wide range of policies to enhance the opportunities for both learning and gaining work experiences (Vanhove, 2016), but skill development through TVET still remained a proven way to enhance the access of youth to the labor market, (Economic Commission for Latin America and the Caribbean, [\(CEPAL\), 2013](#)). In Kenya, Vision 2030, anchored on the economic, social, and political pillars with science, technology and innovation as its foundation, views TVET as the bedrock for the transformation of requisite human resource skills for technological and industrial transformation. This is expected to lead to increased wealth and social wellbeing, and enhancement of the country's international competitiveness (Strategic Plan, 2008 - 2015). TVET system is therefore held to be critical for sustainable industrialization and poverty reduction in Africa and worldwide.

However, global competition has ushered in convergent technologies, which are interdisciplinary, research and development-oriented, information intensive, dynamic, and containing characteristics that influence and define imperatives in education and training systems, Majumdar (2012). Further, New technologies such as artificial intelligence, online learning, 3D printing, among others, have emerged, taken root, and created new institutional ecologies that favour their establishment in the labour market, altering the nature of employment and human resource requirements of the 21st century, Juma, (2016). Consequently, the inability of TVET to train for the current labour market has been manifested in its failure to produce employable graduates and a growing dissatisfaction with the skills possessed by TVET graduates

which has seen most of them remain unemployed. In Kenya, a study by Muthaa, Sang and Mbugua, (2012) revealed lack of consultation between the trainers and the labour market, Kahuria, (2013) revealed TVET learning as teacher centred, and intensely examination oriented, while Ngure, (2015) confirms that TVET in Kenya has difficulty responding adequately to the current industry's skill need.

To re-focus TVET and make it address the mismatch and produce employable graduates, the Government of Kenya introduced reforms for education and training outlined in Sessional Paper No.14 of 2012 in which TVET vision is to produce a skilled, globally competitive, and employable human resource for achievement of Kenya vision 2030, through creation of technological universities. Consequently, Technical University of Kenya (TU-K) was created in 2013 and mandated to provide progression for TVET diploma graduates, transform their work perspectives and equip them with relevant knowledge, skills, and competencies to improve their employability. To achieve this, TU-K developed a two-year Bachelor of Technology (B. Tech) programme which endeavours to offer training that addresses labour market needs through transformative learning experiences (referred to as PT2 and PT3). To date TU-K has graduated eight cohorts of the B. Tech graduates. However, there are concerns about the efficacy of the B. Tech programme and employability of its graduates. It is on this basis and with particular reference to B.Tech graduates of 2011, 2012 and 2013, that the current study sought to examine the effectiveness of transformative learning experiences on the employability of Bachelor of Technology Programme graduates of Technical University of Kenya.

1.2 Statement of the Problem

TVET training is expected to bring about improvement in graduate employability. However, it has become evident that the knowledge, skills, and competencies possessed by TVET graduates are at odds with those required in the 21st century labour market. This has rendered them unemployable and hence unable to be that critical mass of well-trained human resources required to implement programmes and projects identified in Kenya's Vision 2030. To address the mismatch, TU-K was created to re-align TVET programmes to national goals and labour market needs, and to improve TVET graduate employability through a two year B.Tech programme. There are concerns about the efficacy of the B.Tech programme as to whether it has effectively addressed the mismatch and improved the employability of TVET graduates. However, there is scarcity of data to shed light on these concerns. With particular reference to B.Tech graduates of 2011, 2012 and 2013, this study sought to examine the effectiveness of transformative learning experiences on the employability of Bachelor of Technology Programme graduates of Technical University of Kenya.

1.3 Research Questions

- a. To what extent did the learning experiences in the B.Tech programme cause a transformation in the B.Tech graduates' perspectives and their subsequent employability?
- b. To what extent did factors outside the B.Tech programme cause a transformation in the B.Tech graduates' perspectives?

1.4 Research Hypothesis

H_A: There is a significant relationship between transformative learning experiences and graduates' employability

1.5 Conceptual Framework

This study examined the effectiveness of transformative learning experiences on the employability of Bachelor of Technology Programme graduates of Technical University of Kenya. While accomplishing this task, three areas derived from transformative learning theory were the points of focus namely, input, process, and feedback mechanisms. This involved empirical analysis of key variables that are developed from the theoretical perspective. The framework draws a line between unemployment and employability whereby being unemployed means not having a job and being employable means having the qualities needed to get, maintain, and progress in the labour market.

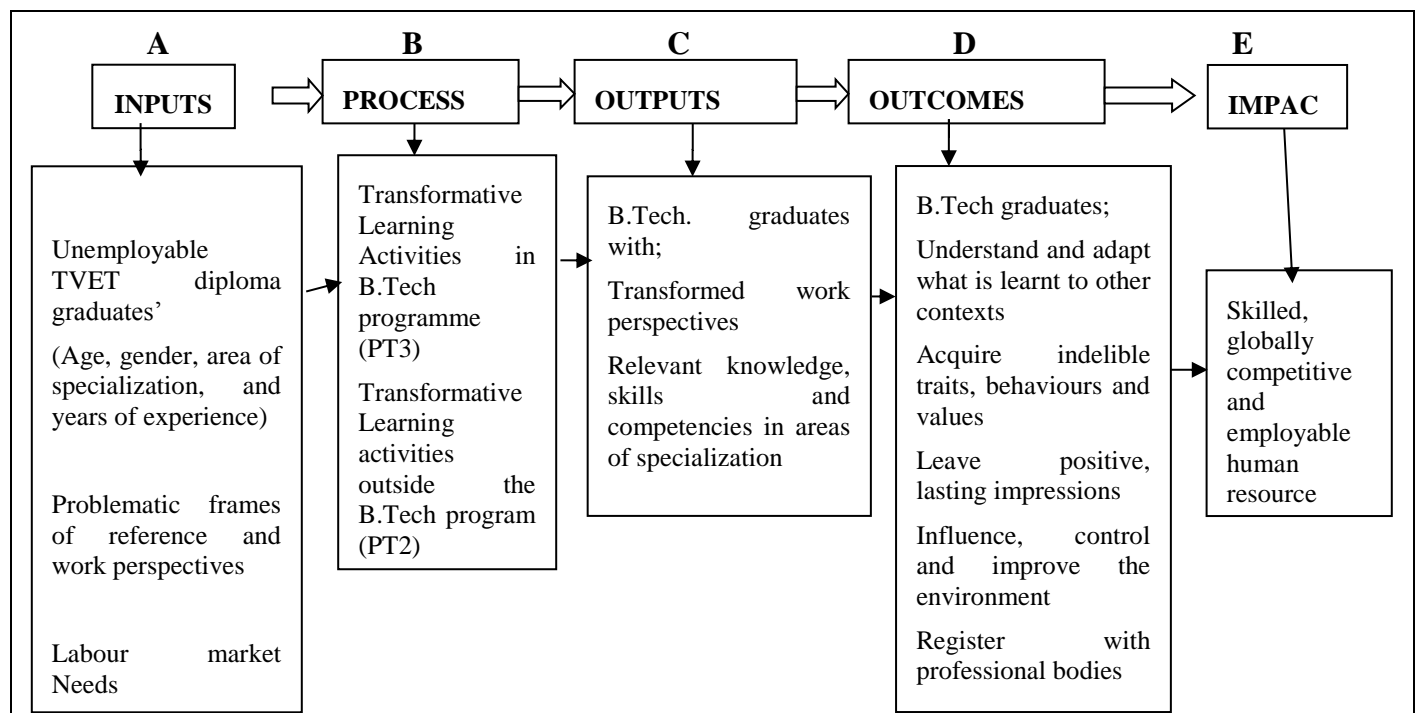


Figure 1: Conceptual Framework for analysing effectiveness of transformative learning experiences on the employability of Bachelor of Technology Programme graduates.

(Source: Field Data, 2015)

Figure 1 indicates that employability is the product of inputs, process, and feedback mechanisms. The input variable here focuses on four aspects: demographic characteristics of unemployable TVET diploma graduates, problematic frames of reference and work perspectives, current labour market needs and B. Tech programme content. The process variable focuses on transformative learning activities, the core principles, and tenets of transformative learning theory as advanced by Mezirow (1978). The feedback mechanism includes the output, outcomes, and impact of the process. Diploma TVET graduates are admitted into the B.Tech programme at TU-K. Their employability is influenced by the instrumental role of both the lecturer and the learner during the teaching-learning process. Transformation in work perspective will depend on the learning activities in the B.Tech programme (PT3), factors outside the B.Tech programme

(PT2), and the core principles and tenets of transformative learning theory. The learning environment must be appropriate for acquisition of a transformed work perspective.

The outcomes of the successful transformative learning process include: B.Tech graduates who understand and adapt what is learnt to other contexts, acquire indelible traits, behaviours and values, leave positive, lasting impressions, influence, control and improve the environment and are registrable with professional bodies. The outcomes may fail to impact on employability of B.Tech graduates especially when the learning activities are not transformative, the learning environment is neither interactive nor learner-centred and the course content is not competency-based. The programme would therefore fail to meet the transformation requirements of the labour market and could raise a need to re-examine the learning process and programme content. The Conceptual Framework builds on the assumption that educational systems shape the matching of people to jobs. For this they should have acquired a right perspective of work and relevant knowledge, skills and competencies required by employers. Therefore, full utilization of the transformative learning process would result in skilled, globally competitive, and employable human resource.

2.0 LITERATURE REVIEW

2.1 Theoretical Framework

This study was guided by transformative learning theory as postulated by Jacques Mezirow (1978), developed extensively by Brookfield, 1986, Cranton, 1994, King, 2000 Freire (1970), Habermas (1981) and Collins (1991), and preferred by 21st century scholars as a transformative learning approach in adult education. In this theory, learning is understood as the process of using a prior interpretation to construe a new or revised interpretation of the meaning of one's experience to guide future action (Mezirow, 2000). Human beings have an instinctive drive to make meaning of their daily lives but since there are no enduring truths, and change is continuous, they cannot always be assured of what they know or believe. It therefore becomes imperative in adulthood that we develop a more critical worldview as we seek ways to better understand our world by learning how to negotiate and act upon our own purposes, values, feelings and meanings rather than those we have uncritically assimilated from others (Mezirow 2000).

Fundamental to the adult learning process are development of reliable beliefs, exploration and validation of their fidelity, and making of informed decisions. Transformative learning theory explains this learning process of constructing and appropriating new and revised interpretations of the meaning of an experience in the world. The transformative process is formed and circumscribed by a frame of reference, which are structures of assumptions and expectations that frame an individual's tacit points of view and influence their thinking, beliefs, and actions, Mezirow (2000). It is the revision of a frame of reference together with reflection on one's experience that is addressed by the theory of perspective transformation and leads to a paradigm shift and a frame of reference that is more inclusive, differentiating, permeable, critically reflective, and integrative of experience (Mezirow, 2000).

A perspective transformation can occur either through a series of cumulative transformed meaning schemes or as a result of an acute personal or social crisis such as a natural disaster, the death of a significant other, divorce, a debilitating accident, war, job loss, or retirement. These

experiences are often stressful and painful and can cause individuals to question the very core of their existence. Mezirow (1978) first applied the concept of transformative learning to a study of re-entry programs for women re-entering higher education. The study revealed that these women had experienced significant transformations in their perspectives and ways of being. From the findings, Mezirow suggested that the transformative process occurs based on ten phases beginning with a disorienting dilemma such as a life event or an incident one experiences as a crisis that cannot be resolved by applying previous problem-solving strategies. One then engages in self-examination often accompanied by unpleasant or undesirable emotions that lead to a critical assessment of assumptions. The person then considers and explores options for forming new roles, relationships or actions. This is followed by a plan of action which consists of acquiring knowledge and skills, trying out new roles, re-negotiating relationships and building competence and self-confidence in the new roles and relationships, and a re-integration into one's life based on conditions dictated by one's new perspectives.

This theoretical framework applied to this study in the sense that the globalization process and technological revolutions and innovations have created a paradigm shift in the labour market which is altering the nature of employment and human resource. Therefore, to be employable in the 21st century labour market, TVET graduates need to upgrade their knowledge, skills and competencies as well as transform their work perspectives for connectivity with the rapidly changing world of work. As the TVET diploma graduates interacted with the labour market, it became clear that their skills were way below the requirements of the labour market. Consequently, many of them remained unemployed or even changed profession for survival purposes. Transformative learning process directly influences the learners' way of seeing things by enabling them to achieve a paradigm shift in their worldview and transformation in their perspectives. They are more likely to revise their underlying assumptions, adopt and apply the new paradigm, (Cranton, 2002). In this study, independent variables (factors inside and outside the B.Tech programme) influenced dependent variable (employability).

2.2 Empirical Review

Kumi, (2012) conducted a study in the United States of America on factors that promote the transformative learning experiences of international graduate-level adult learners from Asia, Europe and Latin America, enrolled in the colleges of Arts, Sciences and Engineering. The purpose was to find out how they experienced transformative learning through educational and non-educational experiences. Five hundred and sixty surveys were distributed, and Sequential explanatory mixed-method research design used to test factors that promote transformative learning experiences of the international graduate-level learners in relation to their demographic characteristics and colleges. Learning Activities Survey (LAS) instrument by King, (2009) was used to collect both quantitative and qualitative data while Pearson Chi-Square, using SPSS software was used to investigate the relationship between factors that promote transformative learning experiences of international graduate-level student learners by demographic characteristics and colleges. Data from the follow-up interviews were analysed using the Atlas.ti software. The study found out that graduate-level adult learners experience perspective transformation in their frame of reference, prior thinking about cultures, and language learning. Limitation of the study included a sample size too limited to generalize for all graduate-level adult learners. Although the study covered the demographic characteristics of all participants, it lacked an analysis of the perceptions of the learners on what learning activities caused their perspective

transformation. This provides an opportunity for this study to include variables missing in the study

A study by King (2009) sought to examine activities that promote perspective transformation among adult learners in higher education. The purpose of the study was to develop and administer an instrument to test specific learning activities that are recognized as promoting perspective transformation among adult learners in higher education. A sample including over 700 participants in three large metropolitan universities were involved. King (1997) developed an instrument entitled the Learning Activities Survey (LAS), which consisted of a questionnaire with objective and free-response items. The instrument used the tenets of Mezirow's 10 stages of perspective transformation as a guideline to frame the items. The study used statistical analysis of normal distribution, percentages, frequencies, Pearson Product Moment Correlation (PPMC) analysis, Spearman Rank Correlation Coefficient, and a follow-up interview. King's (1997) found out that 37.3% of the adult learners in the sampled population experienced perspective transformation in the context of their educational background and that Critical thinking skills, class discussions, and the teacher's mentoring role were indicated to contribute to more than 25% of the participants' perspective transformation. The study concluded that there is a need to conduct more quantitative research on learning activities that promote transformative learning of adult learners in higher education. However, the study did not address the population of the three large metropolitan universities as related to the advantage or otherwise they derived from the perspective transformation. This study examined whether the learning activities in the B.Tech programme promoted a transformation in TVET B. Tech graduates' work perspectives for employability in the current labour market.

Fullerton, (2010) doctoral research provided a beginning point for further research on transformative learning experiences of international adult learners in higher education. The study sought to explore how transformative learning was incorporated into the experiences of eleven college students who were intentionally exposed to transformative learning strategies while engaged in a leadership development program (Fullerton, 2010). The study used a mixed-methods approach with a Developmental Advising Inventory (DAI) and Leadership Knowledge Survey (LKS) instrument. The study also used pre-and post-empirical assessments to serve as a pilot study and open-ended interview questions. The study revealed that age was a strong correlating factor for transformative learning to occur and that transformative learning can and does occur independently. However, the small sample size of eleven college students posed a challenge for generalization. Fullerton's (2010) study was limited to only adult learners in the United States colleges, thereby excluding adult learners from other settings such as TVET.

Harrison's (2008) doctoral research sought to investigate the extent to which participation in a literacy program affected the lives of its participants and how the change was manifested. Multiple case studies that focused on the lives and experiences of four women who participated in the adult literacy program were used. The participants related experiences to the tenets of Mezirow's transformative learning theory to include an exploration of new roles, actions, self-confidence in new roles, development of a plan of action, and reintegration into life based on their new frames of reference. Data were collected using reflective journals and interviews in a semi structured format based on the interview questions from the Learning Activities Survey developed by King (2009). The study used ethnography as an analytic tool that employed grounded theory, leading to the development of a new theory called metamorphosis. The study

concluded that there is deep structural shift as participants reflect on their personal consciousness. Harrison's (2008) study provided information for further studies on transformative learning among international adult learners. However, the study lacked a sample size large enough from which to generalize. In addition, no quantitative data were presented to correlate transformative experiences of adult learners in the context of their employability.

Brock (2007) did a study to investigate transformative learning experiences of undergraduates in business school. The study sought to identify which, if any, learning and support activities contributed to transformative learning in undergraduate business school and to determine if there was a difference between male and female students' experience. Two hundred and fifty-six undergraduate business students in a large north-eastern university in a major metropolitan area in U.S formed the population. The learning Activities Survey in a web-based survey format covering Mezirow's 10 steps leading to transformative learning and areas such as transformative learning, demographic characteristics, and learning experiences encountered through personal interactions, class assignments, and life events was used to collect data. A pilot study was conducted as a measure to check the reliability and validity of the instrument. Data were analysed using two-tailed chi-square tests, *t* tests, partial correlations, and a logistic regression. Data screening was also done to correlate frequencies and percentages of demographic characteristics of all respondents. The study found out that class maturity and classroom assignments contributed to transformative learning experiences of the participants. The study served as a guide on how to use quantitative methods to analyse data for transformative learning experiences of adult learners in higher education. However, the study was limited to only undergraduate students in a business program, which made it difficult to generalize the results to undergraduate students in other degree programs.

3.0 METHODOLOGY

The study used Sequential Explanatory Triangulation Design of Mixed-Method Approach where both quantitative and qualitative approaches were involved. A Quantitative survey was first conducted on a sample of 231 respondents and the data analysed. Thereafter, qualitative interviews were conducted for explanatory purposes and used to validate the outcomes of the quantitative phase. The choice of this design in this study was informed by the philosophical knowledge that collecting diverse types of data best provides an understanding of the research problem, Creswell (2014). *Figure 2* is a summary of the steps followed

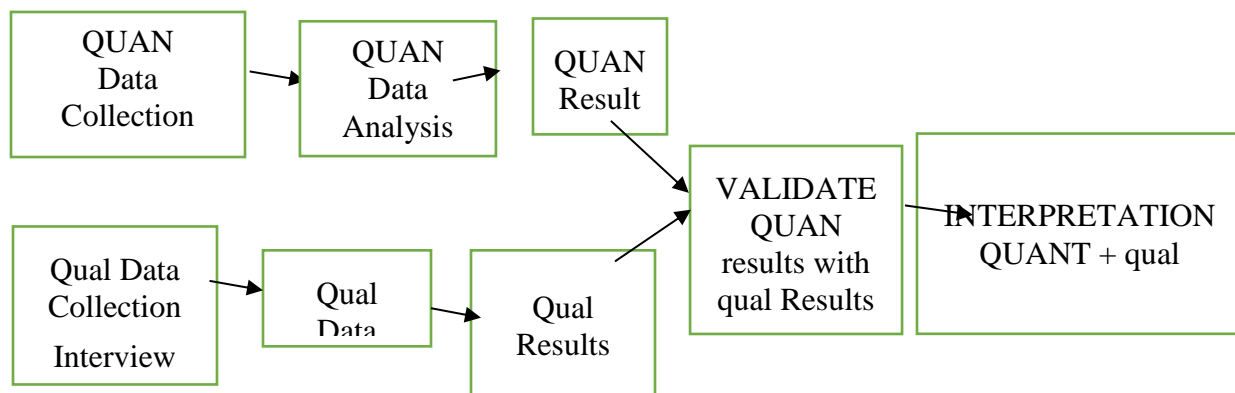


Figure 2: Sequential Explanatory (Triangulation) Design: Validating Quantitative Data Model

(Source: Creswell, 2014)

KEY

QUAN-Quantitative Approach

Qual – Qualitative Approach

In figure 2 capitalization indicates priority on quantitative data. The arrow (\longrightarrow) means sequential form of data collection where one form of data (qualitative) validates the other (quantitative). The study population was made up of two hundred and thirty-one respondents consisting of B. Tech graduates of the 2011, 2012 and 2013 cohorts. The whole population was included in the sample. Both probability and non-probability sampling were used to trace the B. Tech graduates. Stratified sampling was used to select the B. Tech graduates to be included in the interview. Schomburg, (2003), posits that in follow up studies with less than 300 graduates, all the targeted members of the individual cohorts should be included in the sample. He further posits that regardless of this, the response rate is still very often below 50%, sometimes even below 25%.

The specific sampling procedures are explained as follow.

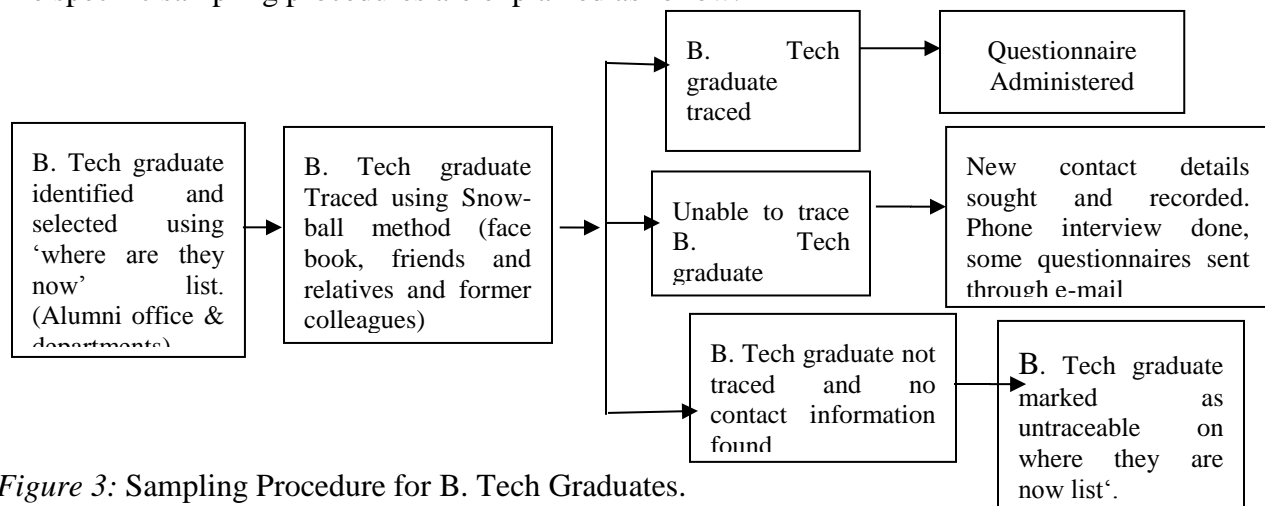


Figure 3: Sampling Procedure for B. Tech Graduates.

(Source: Field Data, 2015)

Figure shows non-probability sampling procedure used to obtain the sample for the B. Tech graduates. Some of the B. Tech graduates were identified using information from the alumni office at TU-K and the various departments from which they took the courses. The researcher used this information to compile a “where they are now” list. Snow-ball sampling method was then used to trace the B. Tech graduates. To those who were traced, the questionnaire was administered. New contact details of those not traced were sought through snowball technique. Three phone interviews were done with employees of two companies who were outside Nairobi on an assignment.

Similarly, one questionnaire was sent by e-mail to an employee of an engineering company who had been sent to Ethiopia to work on a project. Those who could not be traced at all were marked as untraceable on the “where they are now” list. The study also used stratified random sampling method to select a sample from the B.Tech graduates who had indicated their willingness to participate in the interview by providing their telephone numbers and best time to call in the

interview sign-up form. Based on the evaluation and scoring of their responses in part B of the B. Tech graduates' questionnaire the researcher selected a stratified sample of 10% (15 B. Tech graduates).

An interview guide was then administered to the 15 B.Tech graduates in which they were asked to give an in-depth description and explanation to their responses in section B of the questionnaire. This served to cross-validate and corroborate the findings of the quantitative part. A questionnaire and an interview guide were designed, tested for validity and reliability, piloted, and used as measurement tools to obtain data. To determine validity, the research instruments were given to a few selected experts in educational research and evaluation who reviewed and made critical assessment of the items in each instrument. This helped to ascertain their appropriateness and relevance in terms of instructions, wording, and sequencing. Cronbach's alpha coefficient was used to provide a measure of the internal consistency of the research instruments to gauge their reliability.

Table 1: *Reliability and interrelation of variables*

Instrument	Cronbach's Alpha	Number of Items
B. Tech Graduates Questionnaire	0.9	28
Interview Guide for Graduates	0.8	11

(Source: Field Data, 2015)

The variables in table 1 had alpha coefficients ranging between 0.8 and 0.9. Sekaran, (2013) gave a Cronbach's alpha coefficient of 0.7 as the threshold for reliability. Kothari, (2007) added that low reliability is thought to occur when the Cronbach's alpha coefficient is below 0.6 and very high as it approaches 1. Hence a high reliability of the instruments was concluded. Afterwards, the instruments were piloted to further determine their validity and reliability. The feedback confirmed the validity and reliability of the research instruments which were then used for data collection in this study.

The questionnaire was employed to collect quantitative data from the B. Tech graduates while the interview guide was used to collect qualitative data from 15 of them. Section B of the B.Tech graduates' questionnaire and the interview guide were constructed using the ten stages in Mezirow's transformative learning theory to determine if the graduates had a perspective transformation that would indicate that learning was transformative. The measurement tools were administered in line with the sequential explanatory measures whereby the questionnaire was first administered and analysed, and the results used to construct the interview guide which were conducted for explanatory purposes to validate the outcomes of the quantitative phase.

The quantitative phase examined the associations between the B.Tech graduates who experienced transformative learning as a result of factors in the B.Tech programme (PT3) such as group projects, critical and creative thinking, personal self-reflection, non-traditional structure of the course, class presentations and discussion, mentoring, self-evaluation in a course, class activity/exercise/worksheet, assigned reading, class discussion and dialogue, laboratory experience, term papers and essays, and industry-based learning, and factors outside the B.Tech programme (PT2) namely new computers, new technology support in the office, new leadership, emerging unfamiliar work dimensions, rapid transformation in technology, transformation in social life, a feeling of incompetence, and new professional requirements in the workplace also contributed to the transformation.

Section B of the B.Tech graduates' questionnaire and the interview guide were constructed using the ten stages in Mezirow's transformative learning theory to determine if the graduates had a perspective transformation that would indicate that learning was transformative. a disorienting dilemma, self-examination with feelings of guilt or shame, recognition that one's discontent and the process of transformation are shared and that others have negotiated a similar change, exploration of options for new roles, relationships and actions, a critical assessment of assumptions, provisional trying of new roles, planning a course of action, acquisition of knowledge and skills for implementing one's plans, building of competence and self-confidence in new roles and relationships, and a reintegration into one's life on the basis of conditions dictated by one's new perspectives.

4.0 PRESENTATION AND INTERPRETATION OF FINDINGS

4.1 Response Rate

The purpose of this study was to examine the effectiveness of transformative learning experiences on the employability of Bachelor of Technology Programme graduates of Technical University of Kenya. Data were analyzed to answer two research questions and one hypothesis: To what extent did the learning experiences in the B.Tech programme cause a transformation in the B.Tech graduates' perspectives and their subsequent employability? To what extent did factors outside the B.Tech programme cause a transformation in the B.Tech graduates' perspectives? H_A: There is a significant relationship between transformative learning experiences and graduates' employability. Although the study intended to obtain data from 231 B.Tech graduates, only 153 of them actually participated in the final study. This represented a total response rate of 66% as indicated in table 2.

Table 2: *Response Rate*

Participants	Sampled Respondents	No. of Respondents who Participated	Percentage Response Rate
B. Tech Graduates	231	153	66%
Total	231	153	66%

(Source: Field Data, 2015)

The finding in Table 2 revealed a rather low response rate for the B. Tech graduate respondents at 66%. This could have been due to the fact that tracing them was not easy. Indeed, studies by Mzwandile and Ocholla, (2011) and Schomburg, (2003) have shown that to get 100% response from graduates of an individual cohort is difficult, often below 50% and sometimes even below 25% regardless of including all graduates. In the case of this study, however, 66% response rate for the three cohorts of B. Tech graduates (2011, 2012 and 2013), was very good.

4.2 Extent to which the learning activities in the B.Tech programme (PT3) caused a transformation in the B.Tech graduates' work perspectives and subsequent employability

This question was important in this study because one of the objectives of the B. Tech programme is to transform the B. Tech graduates' work perspectives, (Sessional Paper No.14 of 2012). The B. Tech graduates were asked to state whether they experienced a transformation in their work

perspectives on a “Yes” “No” basis. They were also asked to state the aspects of change they experienced, the extent to which the learning experiences in the B.Tech programme (PT3) caused a transformation in their work perspectives and subsequent employability, and the factors outside the B.Tech programme (PT2) that caused a transformation in their work perspectives.

4.2.1 B. Tech Graduates’ transformation in Work Perspectives.

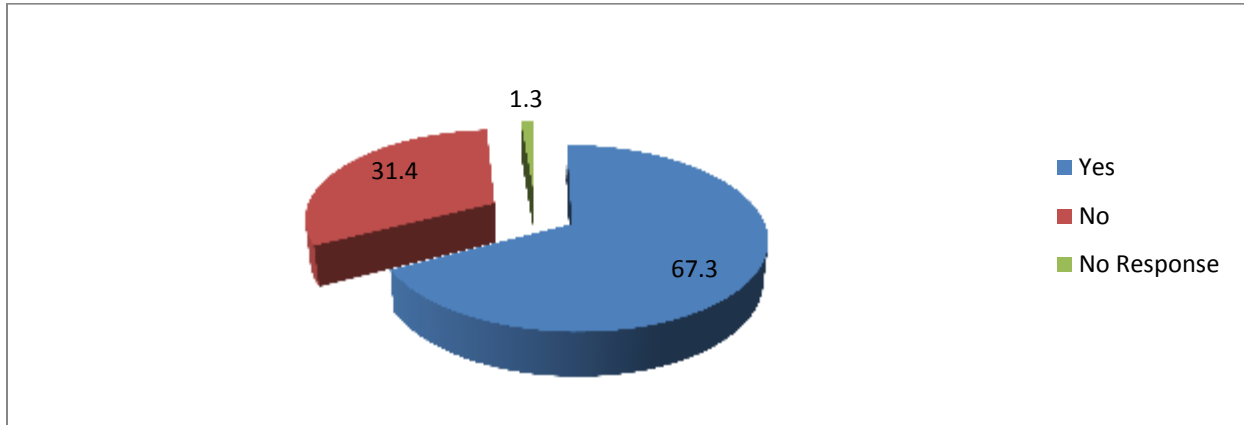


Figure 4: Percentage number of B. Tech graduates who experienced a transformation in work perspective.

(Source: Author, 2015)

Figure 4 shows that the majority (67.3 %) (n=103) of the Bachelor of Technology graduates experienced a transformation in their work perspectives. Only 31.4 % (n=48) did not experience any transformation in their work perspectives while 1 % (n=2) did not respond to this question

4.2.2 Aspects of Change Experienced By B.Tech Graduates

Table 3: Frequency and percentage distribution of Aspects of Change experienced by B.Tech Graduates

Aspect of Change	Frequency (n)	Percentage (%)
I had an experience that caused me to question the way I normally act	83	54.2
Something happened that caused me to question my ideas about social roles	102	66.7
I realized I no longer agree with my previous beliefs or role expectations	108	70.6
I realized I still agreed with my belief or role expectations	31	20.3
I realized that other people also questioned their beliefs	86	56.2
I thought about acting in a different way from my usual belief and roles	74	48.4
I felt uncomfortable with traditional social expectations	98	64.1
I tried out new roles so that I would become more comfortable or confident in them	82	53.6
I tried to figure out a way to adopt these new ways of acting	92	60.1
I gathered the information I needed to adopt these new ways of acting	90	58.8
I began to think about the reaction and feedback from my new behaviour	66	43.1
I took action and adopted these new ways of acting	98	64.1
I do not identify with any of the statements above	26	17.0

Table 3 displays a list of aspects of change proposed by Mezirow, (1978) that could lead to perspective transformation. Section B of the B.Tech graduates' questionnaire and the questions in the interview guide were modelled on these aspects. The purpose was to find out from the B.Tech graduates whether these aspects were part of their learning experiences in the B.Tech programme. The purpose of asking this question was to find out if the transformation was aligned to transformative learning theory tenets, which would mean, therefore, that learning in the B.Tech programme is transformative. Each respondent B.Tech graduate considered each statement and ticked the one that was applicable to him/her.

Fifty four per cent (n=83) of the B.Tech graduates reported that they had an experience that caused them to question the way they normally acted. This is a clear indication that they had a disorienting dilemma. The aspects of change that were experienced by the majority of the respondents included the fact that respondents' beliefs had changed at 71 % (n=108), followed closely by an affirmation that something happened that caused them to question their ideas about social roles at 67% (102). Another 64% (n=98) of the B.Tech graduates said they felt uncomfortable with traditional social expectations. 60% (n=92) of the B.Tech graduates began to figure out ways of adopting new ways of acting while another 64% took action on this. A total of 59% (n=90) of the B.Tech graduates gathered information needed to adopt new ways of acting while 56 % (n=86) had the realization that other people also questioned their beliefs. Fifty four (54) % (n=82) took action by trying out new roles in order to be more comfortable and confident. It is worth noting that 20% (31) of the B.Tech graduates indicated that they still agreed with their earlier beliefs meaning that they did not experience any of the changes stated, and that another 17% (26) did not identify with any of the statements. Similar output results for the interview guide were recorded from the B.Tech graduates who participated in the study and served to cross validate the results of section B of the questionnaire.

These findings have revealed that the majority of the B.Tech graduates joined the B.Tech programme after a disorienting dilemma. Nyerere, (2009) gives an insight into some of the possible dilemmas; some had lost their jobs after their skills were termed obsolete, others had a fruitless search for a job and others were new graduates who feared that they would not get a job with a TVET diploma qualification. In fact, what the researcher has observed is that the majority of the diploma graduates prefer to join the B.Tech programme soon after graduating. These findings indicate that, on average the majority (61%) of the B.Tech graduates experienced all the aspects of change proposed by Mezirow, (1978) in transformative learning theory, which confirms their earlier assertion that they had a transformation in their work perspectives.

4.2.3 Extent to which B.Tech Learning Experiences in the B.Tech Programme (PT3) transformed the B.Tech Graduates' work perspectives and caused Employability.

The B.Tech graduates were asked to indicate from lists provided, the transformative learning activities (PT3) they experienced in the B.Tech programme and the extent to which they perceived them to be related to their employability. This information was important in this study because the responses would reveal the learning activities in the B.Tech programme that are transformative and can therefore be relied upon to cause a perspective transformation and subsequent employability among adult learners in higher education

Table 4: *Frequency Distribution of PT3 Experienced by the B.Tech Graduates and extent of contribution to Employability*

Learning Activity	Distribution of PT3		Extent of PT3 contribution to TWP	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Group Project	104	68	89	58.2
Critical and creative thinking	22	14.4	26	17.0
Personal self-reflection	26	17	28	18.3
Non-Traditional structures of the course	22	14.4	18	11.8
Laboratory experience	78	51	38	25
Class presentation and discussion	86	56.2	70	45.8
Industry-Based Learning	69	45.1	72	47.1
Discussion and dialogue	86	56.2	72	47.1
Mentoring	44	28.8	130	85
Self-evaluation in a course	44	28.8	33	21.6
Class activity/exercise/worksheet	52	34	54	35.3
Assigned reading	44	28.8	38	24.8
Term paper	30	19.6	35	22.9
Other	3	1.96	1	0.7

Table 4 shows the distribution of the learning activities in the B.Tech programme (PT3) that were experienced by the B.Tech graduates and the extent to which they contributed to the B.Tech graduates transformation in work perspectives and subsequent employability. The learning activities were analysed with group projects featuring prominently as a major learning activity 68 % (n=104) which caused a transformation in 58% (n=89) of the respondents. Other significant learning activities cited by at least 50 per cent of the Bachelor of Technology respondents included class presentation and class discussion at 56% (n=86) causing TWP in 46% (n=70) of the respondents each and laboratory experiences at 51% (n=78) and 25% (n=38)TWP. Industry based learning was experienced by 45 % (n=69) of the respondents and contributed to 47% of their TWP. This finding was significant given that the TU-K is expected to promote industrial and practical learning experiences in collaboration with the relevant industrial organizations in Kenya and beyond. The B.Tech graduates also experienced critical and creative thinking at 14% (22) with a contribution to TWP of 17%. Personal self-reflection was experiences at 17% (26) and contributed to 18% of the TWP while non-traditional structure of the course was experienced by 14% (22) of the respondents and contributed to 12% of their TWP

Mentoring was experienced by 29% (44) of the respondents and was responsible for 85% of their TWP while class activities and exercises were experienced by 34% (52) of the respondents and caused 35% of their TWP. Self-evaluation in the course was experienced by 29% (44) of the respondents and caused 22% of their TWP while assigned reading was experienced by 29% (44) of the respondents causing 20% of their TWP while term papers was experienced by 20% (30) of

the respondents causing 23% of their TWP . It is worth noting that the B.Tech graduates who were interviewed gave similar learning activities experienced in the B.Tech programme. To the learning activities mentioned in the questionnaire, they added research and field work experience, lessons acquired in class from lecturers and self-management techniques. From this finding it is clear that the B.Tech graduates experienced all the learning activities indicated in the B.Tech programme in varying degrees. It is also clear that the B.Tech graduates experienced transformation in their work perspectives from the learning activities in the B.Tech programme, also in varying degrees.

These findings have revealed that, except for mentoring which was the greatest contributor to the B.Tech graduates' transformation in work perspectives at 85%, and class discussion and dialogue which contributed at 47%, the other core principles of transformative learning theory (critical and creative thinking, personal-self-reflection) contributed minimally (below 20%) to the B.Tech graduates' transformation in work perspectives.

4.3. Factors outside the B.Tech Programme (PT2) that caused a transformation in the B.Tech graduates 'Work Perspectives.

It is instructive to note that not all the 67.3% of the B.Tech graduate respondents who experienced a transformation in their work perspectives attributed it to the learning activities in the B.Tech programme. There were other factors outside the B.Tech programme (PT2) which were mentioned by the B.Tech graduates as having contributed to their transformation in work perspectives.

Table 5: Frequency Distribution of PT2 contributors to B.Tech Graduates' Transformation in Work Perspectives

Contributor of PT outside B.Tech Programme	Frequency (n)	Percentage (%)
New Computers	57	37.3
New Technology support in the office	71	46.4
New Leadership	20	13.1
New professional requirements	66	43.1
Emerging unfamiliar work dimension	25	16.3
Rapid transformation in technology	69	45.1
Transformation in social life	41	26.8
A feeling of incompetence	19	12.4
Others	1	7.0

Table 5 shows the PT2 factors that caused a transformation in work perspectives of the B.Tech graduates and the frequency with which they did so. The contributors to transformation in work perspectives outside the B.Tech programme learning activities that were experienced by more than 40% of the B.Tech graduates included new technology support in the office according to 46% (n=71) of the respondents, rapid transformation in technology by 45% (n=69), and new professional requirements according to 43% (n=66) of the Bachelor of Technology graduates respondents. For these graduates it was technology and professional requirements that caused their transformation in work perspective. It is little wonder that they reported having had a disorienting dilemma! Other contributors were new computers, transformation in social life, emerging unfamiliar work dimensions, new leadership and a feeling of incompetence all scoring

below 40%. The PT2 factors contributed much less to the B.Tech graduates' transformation in work perspective compared to PT3 factors.

4.3 H_A: There is a significant relationship between transformative learning experiences and graduates' employability

Pearson chi-square test of association was used to test the null hypothesis that there is no significant relationship between the B.Tech graduates' employability and the learning activities in the B.Tech programme. The learning activities that were considered include Group Project, Critical and creative thinking, Personal self-reflection, Non-traditional structures of the course, Mentoring, Class presentation, Industry-based learning, Class Discussion/ Dialogue, Term paper/essay, Self-evaluation in a course, Class activities/ Exercise, Laboratory experience and Assigned reading. The results are shown in Table 6.

Table 6: Results of Chi-square Test for Extent to which PT3 caused Transformation in B.Tech graduates' employability.

Learning Activity (PT3)	Response	TWP- Index 3 n	TWP- Index 3 %	Pearson Chi- square	Degree of Freedom	p-value																																																																																																																				
Group Project	Yes	73	47.7	19.440	4	0.001																																																																																																																				
	No	30	19.6				Critical and creative thinking	Yes	16	10.46	21.482	4	0.000	No	87	56.86	Personal self-reflection	Yes	26	16.99	13.573	4	0.009	No	77	50.33	Non-traditional structures of the course	Yes	16	10.46	10.316	4	0.035	No	87	56.86	Mentoring	Yes	47	30.72	10.344	4	0.035	No	56	34.00	Class presentation	Yes	58	37.90	15.803	4	0.003	No	45	29.41	Industry-based learning	Yes	59	38.56	18.427	4	0.001	No	44	28.76	Class Discussion/ Dialogue	Yes	65	42.48	29.860	4	0.000	No	38	24.84	Term paper/essay	Yes	33	21.57	13.838	4	0.008	No	70	45.75	Self-evaluation in a course	Yes	28	18.30	11.404	4	0.022	No	75	49.02	Class activities/ Exercise	Yes	39	25.49	11.136	4	0.025	No	64	41.83	Laboratory experience	Yes	28	18.30	10.214	4	0.037	No	75	49.02	Assigned reading	Yes	27	17.65	10.464	4
Critical and creative thinking	Yes	16	10.46	21.482	4	0.000																																																																																																																				
	No	87	56.86				Personal self-reflection	Yes	26	16.99	13.573	4	0.009	No	77	50.33	Non-traditional structures of the course	Yes	16	10.46	10.316	4	0.035	No	87	56.86	Mentoring	Yes	47	30.72	10.344	4	0.035	No	56	34.00	Class presentation	Yes	58	37.90	15.803	4	0.003	No	45	29.41	Industry-based learning	Yes	59	38.56	18.427	4	0.001	No	44	28.76	Class Discussion/ Dialogue	Yes	65	42.48	29.860	4	0.000	No	38	24.84	Term paper/essay	Yes	33	21.57	13.838	4	0.008	No	70	45.75	Self-evaluation in a course	Yes	28	18.30	11.404	4	0.022	No	75	49.02	Class activities/ Exercise	Yes	39	25.49	11.136	4	0.025	No	64	41.83	Laboratory experience	Yes	28	18.30	10.214	4	0.037	No	75	49.02	Assigned reading	Yes	27	17.65	10.464	4	0.033	No	76	49.67						
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All the computed chi-square values (p-values) in Table 6 are less than the conventionally accepted level of 0.05. Specifically, group projects has p-value of 0.001, critical and creative thinking 0.000, personal self-reflection 0.009, non-traditional structure of the course 0.035, laboratory experiences 0.037, class presentations 0.003, industry-based learning 0.001, class discussions and dialogue 0.000, term papers and essays 0.008, self-evaluation in a course 0.022, class activities and exercises 0.025 and assigned reading 0.033.

The null hypothesis that there is no significant relationship between transformative learning experiences and graduates' employability is therefore rejected meaning that the B.Tech graduates found all the learning activities in the B.Tech programme related in a significant way to their employability.

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to examine the effectiveness of transformative learning experiences on the employability of Bachelor of Technology Programme graduates of Technical University of Kenya. The study revealed that the majority (67.3%) of the B.Tech graduates had transformation in their work perspectives. Seventy one (71%) of the transformation was due to the learning activities (PT3) in the B.Tech programme. This finding was supported by Pearson chi-square test which revealed that all PT3 had p-values < 0.05 leading to rejection of the null hypothesis and the conclusion that there is a significant relationship between learning activities in the B.Tech programme (PT3) and labour market needs. The B.Tech graduates who had a transformation in their work perspectives experienced all the tenets outlined by Mezirow, (1978), that may be present through the transformative process which are; a disorientating dilemma, self-examination with feelings of guilt or shame, recognition that one's discontent and the process of transformation are shared and that others have negotiated a similar change, exploration of options for new roles, relationships and actions, a critical assessment of assumptions, provisional trying of new roles, planning of a course of action, acquisition of knowledge and skills for implementing one's plans, building of competency and self-confidence in new roles and relationships, and finally, a re-integration into one's life on the basis of conditions dictated by one's new perspective.

The major contributors of transformation in the B.Tech programme and which accounted for more than 50% of the B.Tech graduates' transformation in work perspectives included mentoring, 85%, group project, 58%, class presentation 46%, industry-based learning and trips 47%, and class discussion and dialogue 47%. Next were term papers and essays, self-evaluation, class activities and exercises, laboratory experiences and assigned readings which scored above 20%. Two core principles of transformative learning theory, critical and creative thinking and personal-self-reflection contributed below 20% to Transformation in work perspectives, and so did non-traditional structure of the course. The null hypothesis that "there is no significant relationship between transformative learning experiences and graduates' employability" was therefore rejected leading to the conclusion that there is a significant relationship between learning activities in the B.Tech programme and B.Tech graduates' employability. It was also clear from the findings that not all the B.Tech graduates who experienced a transformation in work perspective attributed it to the learning activities in the B.Tech programme.

The study also found out that 16.3% of the transformation was due to factors outside the programme. These factors included new technology support in the office 46%, rapid transformation in technology 45%, and new professional requirements such as registrability with professional bodies in one's area of specialization and generic skills 43%, among others. Lecturers were also cited by 52% of the B.Tech graduates as having contributed significantly to their transformation in work perspectives.

Conclusions

There is a significant relationship between learning activities in and graduates' employability. Group projects, class presentations, class discussion and dialogue, laboratory experience, term papers and essays, and industry-based learning were the main contributors to the transformation. Lecturers contributed through mentoring and effective use of learning activities in the teaching/learning process. Factors outside the B. Tech programme such as new technology support in the office, rapid transformation in technology and new professional requirements in the labour market also contributed to the transformation. Three core principles of transformative learning theory, critical and creative thinking and personal self-reflection were not strong in their contribution to the transformation.

Recommendations

Technical University of Kenya should re-focus training in the B. Tech programme to be transformative to embrace the dynamism of emerging global trends and their attendant challenges. This is more so because the employers are still presenting opposing opinions on whether the B. Tech graduates are well equipped with employable skills. If adopted by TVET institutions this kind of training can greatly improve employability of graduates.

The core principles of transformative learning theory (critical and creative thinking, personal self-reflection, discussions and dialogue and mentoring) should be strengthened in the teaching/learning process. This study has revealed that these learning activities have the potential of enhancing the B. Tech graduates' transformation in work perspectives and consequently, their employability.

The learning activities that were described by the B. Tech graduates as contributing most to their transformation in work perspectives in the teaching/learning process should be included in the teaching/learning process. These include group projects, class presentations, class discussion, laboratory experience, and industry-based learning and trips, self-evaluation in a course, class exercises, and independent personal reflection and assigned readings. This study has revealed that they can improve the graduates' employability.

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