



Craftsmen Learning Trajectory in the Construction Sector: An Analysis of Everyday Craftsmen Work Practices

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Abstract

Practice-based learning (PBL) pathway is considered to be a predominant approach for craftsmen learning and acquisition of knowledge and skills in many other developing countries, Tanzania inclusive. The skill and knowledge acquired through this pathway is accepted by both employers and educational stakeholders. However, the workplace context where learning and skills is acquired differ across the construction sector due to unique nature of the construction projects, something that can potentially influence the learning and learning trajectory of the learner across similar or different trades. Nonetheless, there exists a controversy on how different learning and learning trajectories are influenced by different working contexts of learning across different sectors. Based on the interview to the selected experienced craftsmen from the construction sector, this study critically examined the craftsman learning experiences across the learning trajectories during the work practices. A total of 19 experienced craftsmen were purposively sampled and interviewed. The results revealed three phases of craftsmanship trajectories, namely: belongingness to craftsmanship, identity formation and immersion into occupation. The learning trajectory also differ between craftsmen in similar trades but with different workplace environment such as formal and informal construction sector. However, irrespective of the experience craftsmen from this approach remain largely semi-skilled with high practical skills and limited theoretical and generic skills. It is recommended that there should be policy intervention in order to address the weaknesses inherent in this approach so that it can be an alternative to formal school training.

Keywords: *Learning; Practice Based Learning; Trajectories; Construction Sector; Craftsman*

1.0 Introduction

Learning occupational skills through practice is well acknowledge in literature (see Eraut, 2010; Billett., 2014). A number of studies has considered a workplace not only as a site for production but also a site for learning and acquiring knowledge and skills (Eraut & Hirsh, 2010; Chan, 2013b). Although studies have argued that the workplaces are reach sources of learning and construction of knowledge,

Lave & Wenger (1991) and Wenger (1998) cautioned that unlike the formal learning, learning through practicing is self-driven, individual constructed and context dependent. Thus, the nature of the workplace, activities, co-workers, values and norms influence the learning process and consequently knowledge and skills acquired. For example, Kerzner (2017) argued that the context nature of the construction industry differs significantly from others such as manufacturing in terms of its temporary nature, temporary teams, geographical location, diversity culture of team members and activities. This can likely influence the workplace learning and skills attained in the construction sector.

Based on the socio-cultural perspective in which learning is understood to be constructed in everyday work practices, it is important to understand how the workplace goals, activities and participation constitute affordances for learning (Fjellström & Kristmansson, 2016; Damayanti et al., 2020). It also involves a complex interplay of personal agency, individual position, identity and individual roles (Goh, 2022; Goh, 2013). Due to these factors individual learning trajectory may differ across the workplaces and in similar workplace but when under different roles (Goh, 2022; Damayanti et al., 2020). Likewise, the trajectory may differ between the workplace with all necessary support compared to where individuals face difficulties in accessing support (Chavez, 2020; Goh & Zukas, 2016). According to Hodgkinson et al., (2008) every situation creates the opportunities for learning which however depends on the learning culture, position, habitus, individual capital and the interaction (Goh, 2013). The fact that these differences affect the learning trajectory, it can equally be logical to assume that there are differences in learning between craftsmen from different trades across different context and trajectories (Metso, 2014).

In Tanzania, like in many other developing countries, the dominant crafts skill learning pathway is informal learning through workplace practices (Höjlund, 2013; Aggarwal, 2013). Given that the approach is informal and unregulated, it is likely to result into significant differences in learning between individuals in similar or different workplace environment irrespective of similar learning goals (Damayanti et al., 2020). The literatures suggest that this Practice-based Learning (PBL) pathway is socially acceptable and recognized by employer (Gessler, 2019; Höjlund, 2013). Likewise, despite lack of certification, several identity categories (such as assistant craftsman, craftsman, senior craftsman, foreman and supervisor) are socially established and accepted. Furthermore, the current Tanzania Education Policy (2014) recognizes PBL as an alternative pathway to vocation education, suggesting that the pathway is likely to lead to the skills required. This social and policy recognition and acceptance by employers, individuals and companies again strengthen the potentiality that the path led to required skills. In order to understand the complex learning process across workplace context it is important to understand the learning trajectory of a craftsman (Damayanti et al., 2020; Chavez, 2020). That can be realised by analyzing their lives, experiences, agentic actions, position in respect to others and interaction (Lyngsnes & Rismark, 2018). Therefore, the study analysed the craftsman learning skills across the learning trajectory in a PBL pathway and how it contributes to their knowledge and skill acquisition. Specifically, the sought to answer the following questions?

- 1) How do learner and craftsmen construct knowledge and skills across the learning trajectory during the work practices?
- 2) How do learner participation and engagement in learning across the trajectory influence the learning and skill acquisition?

2.0 Literature Review

2.1 Learning Trajectory

Learning trajectory is the sequencing of tasks and activities with the objective of progression from one stage to another through increased complexity in the tasks, responsibility and autonomy (Demosthenous et al., 2019; Damayanti et al., 2020). Activities in this case is a concept in given practice community which includes a system of action, using specific tools, rules and with a division of labor (Chavez, 2020). It describes different paths of the learning undertaken by the learner throughout a learning carrier to achieve a defined goal (Lyngsnes & Rismark, 2018; Demosthenous et al., 2019). The terms “trajectory” and “progression” can be used interchangeably when considering individual progression in the learning (Confrey et al., 2014). According to Chavez (2020) a social perspective of the learning trajectory refers to social construction of knowledge as people engage in a community constitute a particular social and cultural practice. Trajectory constitutes the established learning goals, activity’s structure, experience, thinking and learning by learner (Bargagliotti & Anderson, 2017; Clements, 2011).

Craftsman learning trajectory provides an understanding of the learner’s cognitive progression and knowledge acquisition from the very basic stage to the learned ideas (Confrey et al., 2014; Chan, 2011). For instance, it helps to understand how a novice entered into a construction as a casual labor “passive reactor” progresses along the trajectory to learning to an expert who can even supervise projects as a foreman. It can be formed from learner participation in different contexts both in formal institutions and informal such as in school, fellow students, teacher, co-worker, work, leisure and sport activities (Lyngsnes & Rismark, 2018). The sequencing of activities and level of accountability in a trajectory differs across trades whereby in some trades that the learner had more autonomy than others (Chan, 2011; Rintala & Nokelainen, 2020). According to Damayanti et al., (2020) and Billett et al., (2013) the learning trajectory describes the learner developmental progression in solving the task related problems thus increasing complexity in tasks, responsibility and autonomy. The learner progression in the acquisition of knowledge, skills and competence eventually transform the learner from dependent to being independent thus conferred a craftsman identity by society and others (Goh, 2013; Goh & Zukas, 2016). Trajectory is understood through analyzing the learner lives, their experiences, position in respect with others and interaction (Lyngsnes & Rismark, 2018).

In order to understand individual learning trajectory and its relationship with individual knowledge and identity formation, it is important to analyse individual learning track from the novice entry into the construction site as a casual labor to an expert. The learner participation in the continuum of legitimate peripheral participation and full participant describes the learning trajectory (Chan, 2011; Chavez, 2020). Chavez (2020) viewed this continuum of legitimate peripheral participation using the concepts of space and time. Considering the trajectory from space-time helps to understand what is learned, how it is learned, where and when learned. For instance, legitimate peripheral in a learning trajectory provides a novice entry into the community where he/she gradually progress into other stages with changing tasks and roles to the full participant (Chan, 2011). The learner constructs the new identity as they negotiate the changing roles and stages (Kubberød & Pettersen, 2018). The learner progression from peripheral to full participant is facilitated by support and guidance provided by the workplace. Thus, the quality of activities accessed, goals of workplace and access to guidance have significant impact on learner progression (Fjellström & Kristmansson, 2016).

2.2 Boundary Crossing and Identity Formation

The learning trajectory involves a transverse across different learning phases in a similar or different learning sites (Chan, 2011; Sappa & Aprea, 2014). This process also involves a boundary crossing from one phase to another in a similar learning site or a boundary crossing between different learning sites such as between formal and informal learning pathways (Sappa et al., 2016; Akkerman &

Bakker, 2012). The concept of boundary crossing at different stages across the learning trajectory involves the learner's changing roles, identity and responsibility (Chan, 2011). For instance, in a craftsman learning trajectory craftsman may change from a casual laborer, assistant to craftsman, craftsman, senior craftsman and foreman. Dreyfus (2004) identified five categories of identity the learner can construct along the learning trajectory as they transverse from one phase of the learning to another. The identities include advance beginner, competent, proficiency and expert. Learning and identity formation of a learner is a product of the personal agency, the workplace environment including tasks and support (Chan, 2011). Identity transformation from a novice to expert as observed by Dreyfus (2004) also involves the movement across different identities and boundary crossing (Tanggaard, 2007).

The learner transverse across different phases or sites indicates different boundary crossing and identity formation during the learning process (Schaap et al., 2012; Campbell et al., 2009). This is mainly the result of learner changing roles and their position which may eventually necessitates changing learning behavior and disposition along the pathways (Goh, 2022). The evidence of learning and identity transformation is also observed in the learner behavior change such as passion and enthusiasm of the trade (Chan, 2011; Goh, 2013). This is described by how the learner distinguishes their roles at the workplace but also how others recognize the learner progression and changing influence productivity (Chan, 2011). In other types of learning, trajectory provides a way to understand variations between personal agency, positions and identity at different stages and context (Goh, 2022).

2.3 Factors Influencing the Learning Trajectory

The learning trajectory of a learner may differ depending on the workplace and individuals in similar occupational practices and learning goals due to workplace environment and individual agentic actions (Damayanti et al., 2020; Bharatan et al., 2021). Thus, tracing and understanding the learner trajectory and progression across the learning period is important (Chan, 2011). The learning trajectory is influenced by both the learners' personal factors (characteristics and experience), types of trade, workplace goals, workplace environment and the status in the community of practice (Goh, 2022; Goh & Zukas, 2016). Likewise, the trajectory may differ from those who had passion against those entered as hopeful reactors due to differences in the motivation which eventually determines the effort and commitment (Goh & Zukas, 2016). The learner shapes the trajectory depending on their personal agency, disposition, position and workplace affordances (Goh, 2022). Similarly, way the workplace shapes the learner learning (Bargagliotti & Anderson, 2017).

Both the individual and social factors contribute to the individual learning (Goh, 2022). The personal agency constitutes the willingness and enthusiasm to learn or work, effort, work determination and eagerness to utilize the learning opportunities provided by the workplace (Chan, 2011; Goh, 2013). The personal agency and disposition influence how people elect to engage in workplace learning as well as utilizing the opportunities provided by the workplace environment (Goh & Zukas, 2016; Bharatan et al., 2021). With regard to social agency, the relationship with others including networking and collaboration with others determine the speed, depth and the outcome in the identity formation process along the trajectory (Bharatan et al., 2021; Lyngsnes & Rismark, 2018). The personal, social agency and disposition are mostly required to overcome the barriers for learning especially where the workplace environment do not provide sufficient affordances for learning (Goh, 2013).

The trajectory also differs between the workplace with all necessary support compared to the one where individual face difficulties in accessing support from the workplace (Goh, 2022). The learner who had limited access to participation and support was observed to develop different trajectory from the one with full participation and support (Liu & Xu, 2013). The welcoming, supportive and receptive co-workers enriched learner confidence, sense of empowerment and thus self-direct their learning (Levett-Jones et al., 2009).

The level and extent of learner participation into the community depends on the expert-novice relationship (power relations) which eventually influence the learning trajectory (Kubberød & Pettersen, 2018; Liu & Xu, 2013). Individuals provide the evidence of learning but due to different power relations they have different learning trajectories and strategies (Liu & Xu, 2013). Low power relations may facilitate learning because it facilitates access to learning affordances while on other hand distant power relations constrain learning due to limited access to affordances of learning (Kubberød & Pettersen, 2018; Liu & Xu, 2013). The empirical evidence from a study carried out for Masters' students in Norway established that engineer students had low power relations compared to social science students with distant power relations, hence more conducive environment for learning (Kubberød & Pettersen, 2018). Limited access to participation and support by the social science students' result into high/distant power relations whereby students were marginalized and placed to peripheral participation of community, making learning acquired through trial and error (Kubberød & Pettersen, 2018). As a result, these students were more creative and discover than those with low power relations.

3.0 Research Methodology

3.1 Research Design

This study is a part of a PhD study in which a mixed research design was used. The data presented in this paper constitute a qualitative part which was used to explore the learning experience of the practicing craftsmen in the construction sector. This is because qualitative research allows researcher to study things in real-life and natural context thus interpret a phenomenon from the meaning people attach to them (Chan, 2013b). Since the research aimed to investigate in detail the craftsman experience of learning; interview, conversation, discussion and observation were the most appropriate data collection techniques. It is due to this reason a semi-structure interview and observation were used for data collection from the participants. The interviews were carried out at the workplace in order to provide the opportunity for observation before, during or after the interview. Observation was used to study how the novice "*helpers*" interact with the experienced craftsmen by asking or seeking clarification, interact with artefacts and how craftsmen provide guidance and help. Other studies such as Littlejohn et al., (2016) used ethnographic approach to analyse informal learning process. This method was difficult to use in the current study due to two reasons. First, informal construction craftsmen are self-employed, mobile and located in different sites. It would be difficult to study them over a long period of time at one particular site or workplace. Secondly, the participant were the craftsmen who had already experienced learning in different learning contexts thus understanding their experience researcher participation in workplace was important (Littlejohn et al., 2016).

Apart from enabling the craftsmen to explain their learning experiences, interviews enabled recalling the learning (Littlejohn et al., 2016). Researcher helped the respondents to identify and describe the aspects of learning through working and making sure they are able to distinguish training and learning.

3.2 Data Collection

Given the informality nature of the study and lack of clear set of key participants in this study, the interview was preceded by questionnaire surveys (PhD study) which helped the researcher to establish the criteria that were used for selecting key participants for the interviews (Littlejohn et al., 2016). The criterial used for selecting respondents for the interview were respondent general experience, experience of working in large construction projects preferably employed by construction companies whether on temporary or permanent employment bases. Due to the fact that majority of craftsmen lacks physical address, research recorded their phone number during the surveys which were later used to contact the

respondents and requested their consent to participate in the interviews. Based on the criteria proposed above, about (n=24) craftsmen agreed to participate in the interview. Out of these, 19 responded to a face-to-face interview in masonry, carpentry, steel fixing and multi-skilled as shown in Table 4.1. Different trades were used in order to study similarities and differences in the learning trajectory between the trades. The participants were composed of those who acquired skills purely through practice (PBL) and those who acquired crafts skills through formal system (TSS, VTC & VET). The main reason is that PBL covered both formal trained and informal trained craftsmen when engaged in work practices (Fjellström, 2014; Chan, 2011).

Table 4: 1: Summary of respondents interviewed

SN	Trade type	Expert (Yrs)	Education Level	Learning Pathways	No. of trainees	Frequent Employer
1	Mason (M1)	26	VET Grade I Test	VET	>30	Contractors
2	Mason (M2)	21	Standard VII	PBL		Individual Client
3	Mason (M3)	23	Standard VII	PBL	-	Contractors
4	Mason (M4)	21	Standard VII & Grade II Test	PBL	-	Contractors
5	Mason (M5)	20	Standard VII	PBL	-	Contractors
6	Mason (M6)	20	Standard VII	PBL	>6	Contractors
7	Mason (M7)	21	Standard VII	PBL	>7	Individual Client
8	Multi-skilled (MS1)	27	Standard VII	PBL	8	Individual Client
9	Multi-skilled (MS2)	26	VTC	VTC	>30	Contractors
10	Multi-skilled (MS3)	21	Standard VII & Grade II Test	PBL	8	Contractor/Individuals
11	Multi-skilled (MS4)	22	VET	VET	5	Private Client
12	Carpenter (C1)	20	Form IV	TSS	>40	Contractors
13	Carpenter (C2)	21	Standard VII	PBL	>40	Contractors
14	Carpenter (C3)	20	Dropped VTC year II	TS	-	Contractors
15	Steel fixer (SF1)	25	Dropped Form II	PBL	>30	Contractors
16	Steel fixer (SF2)	25	Standard VII	PBL	>20	Contractors
17	Steel fixer (SF3)	20	Standard VII	PBL	>35	Contractors
18	Steel fixer (SF4)	21	Standard VII	PBL	>12	Contractors
19	Steel fixer (SF5)	20	Dropped Form V	PBL	>15	Contractors

VET = Vocational education training, PBL = Practice-based learning, TSS= Technical Secondary School, VTC=Vocational training college

The interview was designed to cover the main aspects from novice entry into occupation, motives for the learning a trade, progression into a trade, craftsman identities and factors influencing the learning trajectory. Specific questions were how did they enter into a trade? what/who attracted them to enter a trade? How did they go through the whole learning process from novice to full craftsman? How the activities engaged, project types the sectors' formality, people interacted with, support and assistance influence learning. The study also examined how did general learning environment affected learning process. Nineteen (19) study participants responded to the interview and the time ranged between 52 minutes to 80 minutes and mostly conducted at craftsmen working place.

3.3 Data Analysis

The data collected were organized in narratives to make it easier to compare and establish patterns (themes) (Braun & Clarke, 2012). This analysis was highly influenced by the meanings that emerged in the data (Iftikhar & Lions, 2022). Themes were derived from the data based on the concepts from the Situated Learning Theory (SLT) (Lave & Wenger, 1991) and Wenger (2010). Based on the practical guide for thematic analysis by Braun & Clarke (2012) the first step involved reading the transcription and identify the narratives from the data with various concepts indicating learner entry into learning and development through the learning trajectory. Secondly, these narratives were coded focusing on the learning stages. Thirdly, following the pattern on data sub-theme from different participants were classified. Lastly, based on the sub-themes, the main themes were formed as shows in Table 4.2.

Across the learning trajectory of a craftsman three broad themes were conceptualized which are belonging to a craftsmanship which describe novice entry and belonging to a craftsmanship community, identity formation which follows the process of belonging and immersing in an occupation which describe craftsmen development of professionalism including certification of skills acquired through practices. These themes also signify the three phases the learner transverse throughout the learning journey.

Table 4.2 Themes extracted from the interview

Themes	Sub-themes	Illustration quote
Belonging to a craftsmanship	Entry into construction	My plan was to proceed with secondary studies I entered construction as a helper out of my wish (Mason M4)
	Initial participation	I started as a cleaner in a Catholic Parish then when watching masonry, I was interested and joined (Mason M2)
	Commitment to a craftsmanship	I joined a sector as a helper after failure to join secondary studies but I realize I could earn income to sustain my life. So, I decided to learn this profession (Mason M4).
	Legitimate participation	I was working with Engineer in high rise building at Msasani. He gave all freedom to play with all sort of drawings and ask for assistance (Carpenter C1)
Craftsman identity Formation	Forming trade identity	I have supervised a steel fixing works for 10 storeys building at Kariakoo. Many of my client both companies and individuals call me be a foreman steel fixing works for different projects (Steel Fixer SF2)
	Skills advancement	After my 21 years of experience, I have managed to develop some skills. In reading drawings 70%, estimating 75-80%, materials 95%, contract 30% and supervision 60% (Mason M4)
	Skill diversity	You may come across a craftsman who acquired skills through PBL approach with 20 years of experience but cannot read and

Table 4.2 Themes extracted from the interview

Themes	Sub-themes	Illustration quote
		interprets technical drawings for low rise (Multi-skilled MS2).
	Copying with skill diversity	I learn in those old days when we were not using drawings but now every building, we use drawings. When I meet a challenge, I call my colleague even if he/she is not working in that project, we discuss together and agree a way forward (MS1)
Craftsman immersion into occupation	Develop passion to occupation	I thank my supervisor who trained me and develop passion in steel fixing. Now I can give estimate for the works within just few of hours (Steel Fixer SF1)
	Development of professionalism	In my experience of 21 years have undertaken trade test grade III and II and I'm still looking opportunities to improve my skills on the reading of drawings as well as estimating (Mason M4)
	Lifelong learning behaviour	You must seek for new knowledge and skills throughout your life carrier. I like watching a TV program for "UJENZI" meaning CONSTRUCTION to add skills on techniques, materials and different new things in a sector (Mason M4)
	Self-assessment & future plans	Despite 20 years of experience in this field my skills on reading of drawing and estimating is still low. If there is an arrangement for further training and certification, I'm ready to attend (Mason M6)

4.0 Results

4.1 Respondent Profile

The 19 respondents participated in the study had age ranging between 36 - 49 years. The experience of craftsmen as indicated in Table 1 ranges between 20 – 27 years of practicing as craftsmen. Majority of participants were frequently engaged and working in companies mostly on temporary contract or casual labor in a project. The analysis of the data shows that 14 of 19 craftsmen interviewed entered into their respective trade completely unskilled as casual laborers and the rest had skills from VET. Majority who entered into learning through practices not as their first priority but because of lack of other options particularly to proceed with further learning.

4.2 Belonging, Identity Formation and Craftsman Immersion into Occupation

The analysis of findings from participants revealed that craftsman learning trajectory could traversed along three phases described in a metaphor of belonging to a craftsmanship, identity formation and immersion into a craftsmanship occupation. The first phase “belonging” describes participants establishing a sense of belongingness to a workplace (Levett-Jones et al., 2009) and integral part of community through observation of works and interaction with co-workers. The second phase of the

identity formation describes the novice progression in skill and knowledge acquisition, application and integration into work as skilled person depending on their roles and responsibility. The third phase of immersion into the occupation describes the craftsmen development of passion and considering work not as a trade but a carrier (Chan, 2013b). At the stage of immersion into occupation, a craftsman is expected to have acquired enough skills and competence not only in working independently but also in training others. The movement from one phase to another involves changing the tasks and responsibilities beginning from purely a novice at peripheral to a competent craftsman at the immersion into occupation as craftsmen.

4.2.1 Belonging to a Craftsmanship

All participants argued that they entered into their current trades unwillingly but due to lack of other options after failure to traverse into the lower secondary or high secondary partly due to family poverty or failure in exams. Majority of the novices entered into trade not out of “passion” but accidentally including those who joined through VTC & VET. Gessler (2019) and Teal (2016) observed that youth entered into construction and consequently into informal PBL pathway accidentally due to limited chances in other carrier choice. The participant from the interview put it this way:

I had no dream to become a craftsman. When I completed primary school level, I was selected to join secondary school but I failed to join because of the economic hardship of my parents. So, I had to enter into construction as a helper (Mason M4).

It was revealed that majority entered into craftsmanship learning trajectory through proximal participation in non-trade specific tasks as casual labourers in masonry, carpentry and steel fixing; where they had access to opportunities for observation, listening and interacting with experienced co-workers and consequently developed a sense of belongingness and interest into a craftsmanship trade (Chan, 2013b). The novice progression along trajectory from proximal to legitimate peripheral participation is highly influenced by individual agency such as interest and passion, enthusiasm, and individual goals which drive and motivate novice to learn to achieve goals. For instance, in a proximal participation, an “unskilled labour” famously known as “helper” noted a significant difference in their payment from that of a “skilled craftsman”, which eventually resulted into novice self-motivation to acquire knowledge and skills to attain competence and craftsman status so as to increase their income. The participant argued that; “at the end of the week when payment is made ones sees the difference between the helper and the craftsman” (Carpenter C1). In this case, he/she is motivated to learn to become a full craftsman and work independently to get full payment.

The novice progression from proximal to a peripheral participation in a belonging phase facilitates the novice integration and consolidation into a community of practice, hence get access to more learning opportunities as they interact with other craftsmen, building tools and equipment, building materials and drawings of different types. The novice passion, efforts and motivation to learn and seek guidance at this stage encourages experienced craftsmen to provide the necessary support and guidance (Bharatan et al., 2021; Goh, 2022). The transverse from belonging to a craftsmanship to identity formation depends on both the novice personal agency to exploit the necessary opportunities provided by the workplace and the affordances and support provided by the workplace itself and the experienced workers (Palesy & Billet, 2017; Ferm, 2021). Due to this individual behaviour, some novice craftsmen were more effective in learning compared to others.

In learning craft skills, individual effort is very important. A helper with effort will be observing and listening when experienced craftsman is building. They are investigative and they will always ask why this is done this way because they want to know the reasons behind. A helper who doesn't ask is lazy and does not want to learn (Mason M5).

The implication is that although the workplace may provide similar affordances to all novice engagement and participating in the workplace learning, variation in skills acquired may be attributed to individual agency and the learning goals. Individual agency is important in the adult learning (Merriam, 2018) where the learning is highly controlled and determined by the learner. It is further observed that the novice who had passion and were enthusiastic would utilize all the opportunities for observing, listening, asking and practising to learn and acquire knowledge and skills. The learner individual agency indicated from the interview excerpts coupled with increasing complexity of the workplace tasks and responsibilities facilitates the learners' development of different identities along the learning trajectory, as discussed here under.

4.2.2 Identity Formation

The novice progression into a learning trajectory with increasing complexity of the nature of tasks and responsibilities facilitates the learners' boundary crossing from belonging to a craftsmanship into different trade identities across the trajectory. This implies craftsman novice skills and knowledge acquisition, changing roles and responsibility as well as recognition into workplace by peers and society as the learner transverse through the learning path (Ferm, 2021; Ferm et al., 2019). It also entails the learners' movement from the peripheral towards the full participation in a CoP exposes a novice not only the learning opportunities but also the norms, values and practices of that community.

Findings from the study confirm the effectiveness of the construction practices in formation of identity as a novice, assistant craftsman, craftsman, master craftsman and a foreman for various construction works on site. The learner transition from one identity to another not only provides the opportunity for learning technical and generic skills and knowledge but also increasing the challenging tasks and responsibilities which consequently provide more opportunities for learning. This is evidenced by the learners' acquisition of skills for estimation (ability to prepare quotation for the work), supervision (for instance the foremen) and project management (handling the multiple projects) although of small scale. This is evidenced in the vignette (Steel Fixer SF2).

I have supervised work for steel fixing for ten storey building at Kariakoo from basement to completion. Recently I managed to accomplish construction of a two storey building in Dodoma. I supervised the whole building including hiring and paying of laborers In two weeks I will start another two storey building projects.

The aforementioned extract also indicates craftsmen identity as "supervisor" with different skills such as negotiation skills, price charging skills, soliciting work skills, estimating skills, leadership and supervision skills. The learning trajectory and identity formation in this study provides the evidence of the concept of workplace curriculum (Billett, 2006; Billett, 2011) because the novice has started and finalized the project on time but also performed some ad hoc kind of learning tasks and responsibilities during the learning period. One participant put it this way:

When I entered into construction site, I started observing the way experienced craftsmen were carrying out the works, mixing materials and building. Then I started learning dimensions, different tools and finally practice under guidance. After 4 years, I managed to work independently in normal residential buildings (Mason M5).

The time to attain a particular identity formation however were likely different from one apprentice to another and from a trade to another. For instance, steels fixing novice took between 1-2 years to start working independently as craftsman compared to carpentry and masonry which took between 3-4 years to work independently. Some craftsmen could further develop skills and identity as supervisors and foremen. The identity formation was observed to be situated and context dependent and in some cases, the identity conferred to craftsmen did not truly reflect their skills and the competencies

required for that identity. “*You may be working as a craftsman in the informal sector, but when you go to companies in formal sector, they may disqualify you based on the standard and quality requirement in the formal sector*” (Mason M4). Identity was also shaped by craft skill learning pathway (VET or PBL), opportunities offered by workplace such as nature of work or tasks learner engaged, peers or expert they interact with and guidance and support offered by peers and experts. It is due to this reason learner from the formal construction sector were likely to develop different identities compared to those from the informal sector.

4.2.3 Immersion into a Trade or Occupation

This section describes the craftsman increased professionalism into the trade not just as a work but a career and call. The analysis of the interview revealed that although the learners entered into the construction sector accidentally, they progressed along trajectory and boundary crossing, developed enthusiasm, passion and love of the craftsmanship thus immersing into the occupation. Craftsmen who immersed in an occupation considered a craftsmanship not just as trade but more of career and put all efforts on learning to improve it. The evidence of this is indicated in this excerpt from a participant who argued that;

I thank my supervisor who trained me and developed passion in steel fixing to an extent that if you give me a drawing, I can give you an estimate of the materials in a matter of just a few hours (Steel Fixer SF1).

The passion to work develop an interest for learning and identity formation in one’s particular field. For craftsmen immersion into a trade provides craftsmen opportunity to make self-assessment of the strengths and weaknesses in knowledge and skills. With regard to this, a craftsman with 20 years’ experience argued that “*Despite my experience, my skills in reading drawings remains low, so is the estimating skills. The two go together*” (Mason M6). At this phase, participants underscore that those craftsmen from both VTC and VET were stronger in technical and generic skills such as reading and interpreting the technical drawings, estimating and contract skills compared to those with similar experience acquired from PBL pathway. This indicates that some skills were difficult to acquire through practicing alone due to strong need of theoretical skills foundation such as numeric and arithmetic.

For other participants’ craftsmen at this phase despite recognition of skills they possess, they also acknowledged the training needs as well as the importance of having their skills recognition and certification through Trade Test. The participant argued that; “*If there is arrangement for short course and get certified I would be ready*” (Multi-skilled MS1). Out of the 14 participants from PBL pathway, 2 participants had passed Trade Test Level I or II, making their skills certified. This indicates a craftsmen development in both career and professionalism. In addition, despite their experience, craftsmen were continuously seeking for new knowledge and improve their skills in line with the changes taking place in the construction sector, as indicated in excerpt from Mason M4

Construction is rapidly changing so I’m always keen to improve my profession by seeking for new skills and knowledge. I like the TV program that goes by the name “UJENZI” meaning “CONSTRUCTION” where professionals’ and suppliers present different building materials, construction techniques and many other things related to construction (Mason M4).

The implication of this is that some craftsmen considered crafts skill learning as a long life particularly due to changes in the construction sector in terms of materials, construction methods and technology. In the interview, craftsmen indicated that among the approaches used in the lifelong learning was interaction with other experts on site, through social media and through interaction with artifacts such television (Fjellström & Kristmansson, 2016; Jaarsma et al., 2011). Other strategies for learning at this phase included networking with others in working (Wakkee et al., 2018) and through reflection of one previous experience (Kolb, 2015; Engeström, 2018).

5.0 Discussion

This paper has provided robust evidence that craft skill learning can be regarded to be a progression from peripheral along the learning trajectory as the roles, responsibilities, skills and knowledge increase towards full participation. It is revealed that “belonging to a craftsmanship phase” introduce and invite a novice to the workplace learning opportunities. These include the community of other craftsmen, nature of the construction environment, construction activities, people and materials the learner is interacting with in their daily working practices. Belonging to the workplace provides the opportunity for observing, listening, asking, guidance, support and practicing (Chan, 2014; Littlejohn et al., 2016). However, these invitations do not constitute learning but the nature of tasks engaged, individual goals and agency which consequently impact on how the learner utilizes such affordances provided by the workplace environment (Bharatan et al., 2021; Damayanti et al., 2020). Due to these differences, the learners who demonstrated more effort were clearly observed which in turn led to increased skill acquisition and identity differences between different participants in the study. This was likely due to fact that access to formal projects provided more authentic works which together with individual goal and passion can lead to a self-drives and motivation for learning and identity formation.

At the phase of identity formation of a learning trajectory, the study revealed that identity formation is both socially and individual constructed. A social identity conferred to a craftsman was situated and linked to the tasks undertaken as well as roles and responsibilities of learner. The novices from the formal and informal construction sector had different learning trajectories and extents of identity formation. The findings correspond to the empirical findings from Bargagliotti & Anderson (2017) and Goh (2022) who established that the nature of the workplace environment and affordance influence the learning trajectory and the identity formation. The difference in the identity formation was likely attributed to the difference in the standards and quality requirement between the formal and informal construction sector. As such, those who acquired skills from the formal sector were likely to benefit than those from the informal sectors. The findings further revealed that identity formation is situational since it depends on the workplace with experienced craftsmen, other experts as well as artifacts including tools, equipment and materials. The learner progression in the identity formation and boundary crossing between one phase to another or between different sites led into the learners’ immersion into the occupation.

With regard to craftsmen immersion into a practice phase, this study has indicted learning is a lifelong and continue throughout the craftsman working life. Despite the learner immersion into occupation, findings from this study have revealed that majority of craftsmen from PBL pathway were semi-skilled despite their vast experiences. Lack of standardization and structure of the learning might be the main cause of this shortcoming. These findings correspond to Gessler (2019) and Teal (2016) who observed the prevalence of more strength in technical and practical skills but weak and limited generic and theoretical skills. In order to cope with skill shortage, craftsmen usually establish social network and collaboration with other more skilled craftsmen so as to transfer skills and experience (Wakkee et al., 2018).

Conclusion and Recommendations

This paper sought to understand “the craftsman learning process using the learning trajectory and how the work practices contribute to the process”. The study has shown that the learning trajectories differ between craftsmen in similar trades but in different workplace environment such as formal and informal but also across different trades in similar or different workplace environments. It is further noted that the scale, speed and depth of movement and boundary crossing along a trajectory depends on the learners’ agency in the utilization of the opportunities provided by the circumstances of the workplace.

The learner construct different levels of knowledge and skills through engagement in all phases of the learning trajectory. At the “belonging phase” the learner learns the basic skills and create a sense of belongingness. The transverse and cross boundary into other phases also marks advancement in the roles, responsibilities consequently advancement in skills and knowledge. Across the phases of the learning trajectory the learner constructs learning through social-material interaction including co-workers, experienced craftsmen, other experts as well as artifacts including tools, equipment and materials.

With regard to theory contribution, this study has established that both the learning and identity formation are highly social and context dependent. Therefore, they are affected by the social circumstances in which the craftsmen are engaged. Although individual agency was observed to have significant impact on the individual learning, such impact would be effective were the socio-materials circumstances were observed to provide the opportunity for individual learning. For instance, the social circumstances such as experts and peers provided enough support and guidance the individual agency such as effort to utilize such opportunities can contribute to the individual learning and skill acquisition.

This takes place even in the absence of a policy intervention, suggesting that with a policy intervention more can be achieved. In other countries (Nordic countries) the practice-based learning approach is purposefully designed and regulated as an alternative to the formal classroom approach. Tanzania is different because the approach emerged in a response to the barriers in the learning occupational skills and knowledge through the formal approach including financial constraints, limited opportunities for entry as well as the entry qualifications. These findings call for the rethinking of the current system of vocational training and how the real practices in the workplace can be used as an alternative to or alongside the current classroom approach. The significant variation in crafts skills among the craftsmen suggest a very loosely and unregulated system, calling for a need for policy intervention.

References

- Aggarwal, A. (2013). Lessons learnt from informal apprenticeship initiatives in Southern and Eastern Africa. In S. Akoojee, P. Gonon, U. Hauschildt, & C. Hofmann (Ed.), *5th International Conference of the International Network on Innovative Apprenticeship (INAP)*, (pp. 113-116). Johannesburg.
- Akkerman, S. F., & Bakker, A. (2012). Crossing Boundaries Between School and Work During Apprenticeships. *Vocations and Learning*, 5, 153–173. doi:10.1007/s12186-011-9073-6
- Bargagliotti, A. E., & Anderson, C. R. (2017). Using Learning Trajectories for Teacher Learning to Structure Professional Development. *Mathematical Thinking and Learning*, 19(4), 237-259 . doi:10.1080/10986065.2017.1365222
- Bharatan, I., Swan, J., & Oborn, E. (2021). Navigating turbulent waters: Crafting learning trajectories in a changing work context. *Human relations*, 1-29. doi:10.1177/00187267211010366
- Billett, S. (2006). Constituting the workplace curriculum. *Journal of curriculum studies*, 38(1), 31-48.
- Billett, S. (2011). Workplace curriculum: practice and propositions. In F. Dochy, D. Gijbels, M. Segers, & P. V. Bossche, *Theories of learning for workplace: building blocks for training and professional development programmes* (pp. 17-36). London : Routledge .
- Billett, S. (2014). Learning in the circumstances of practice. *Internation journal of life long education*, 33(5), 674–693.

- Billett, S., Sweet, L., & Glover, P. (2013). The Curriculum and Pedagogic Properties of Practice-based Experiences: The Case of Midwifery Students. *Vocations and Learning*, 6, 237–257. doi:10.1007/s12186-012-9094-9
- Braun, V., & Clarke, V. (2012). Thematic analysis. In H. Cooper, P. Camic, D. Long, A. Panter, D. Rindskopf, & K. Sher, *APA Handbook of Research Methods in Psychology: Research Designs: Quantitative, Qualitative, Neuropsychological and Biological* (pp. 57-71). Washington: American Psychological Association. doi:10.1037/13620-000
- Campbell, M., Verenikina, I., & Herrington, A. (2009). Intersection of trajectories: a newcomer in a community of practice. *Journal of Workplace Learning*, 21(8), 647-657.
- Chan, S. (2011). *Belonging, becoming and being a baker: the role and process of apprenticeship*. Phd thesis, Griffith University . Retrieved December 20, 2021, from <http://hdl.handle.net/10072/365901>
- Chan, S. (2013b). Learning through apprenticeship: belonging to a workplace, becoming and being. *Vocations and learning*, DOI 10.1007/s12186-013-9100-x.
- Chan, S. (2014). Belonging to a workplace: first-year apprentices' perspectives on factors determining engagement and continuation through apprenticeship. *International journal of education vocation and guidance*(DOI 10.1007/s10775-014-9282-2).
- Chavez, J. (2020). Space-time in the study of learning trajectories. *Learning: Research and Practice*, 1-18. doi:10.1080/23735082.2020.1811884
- Clements, D. H. (2011). Learning trajectories: Foundations for effective research-based education. In L. R. Wiest, & T. Lamberg (Ed.), *Proceedings of the 33rd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. (pp. 365-372). Reno, NV: University of Nevada.
- Confrey, J., Maloney, A. P., & Corley, A. K. (2014). Learning trajectories: a framework for connecting standards with curriculum. *ZDM Mathematics Education*. doi:10.1007/s11858-014-0598-7
- Damayanti, N. W., Purwanto, Parta, I. N., Chandra, T. D., & Loupatty, P. M. (2020). Learning trajectory student to solve problem based on manipulatives. *International journal of scientific & technology research*, 9(2), 4280-4284.
- Demosthenous, E., Christou, C., & Pitta-Pantazi, D. (2019). Classroom assessment tasks and learning trajectories. *Eleventh Congress of the European Society for Research in Mathematics Education, Febr, 2019*. Utrecht University, Netherlands . Retrieved 8 18, 2022, from <https://hal.archives-ouvertes.fr/hal-02430522>
- Dreyfus, S. E. (2004). The Five-Stage Model of Adult Skill Acquisition. *Bulletin of Science, Technology & Society* , 24(3), 177-181. doi:10.1177/0270467604264992
- Engeström, Y. (2018). Expansive learning: towards an activity-theoretical reconceptualization. In K. Illeris, & K. Illeris (Ed.), *Contemporary theories of learning: learning theorist in their own words* (Second ed.). London, UK: Routledge.
- Eraut, M. (2010). Knowledge, working practices, and learning. In S. Billett, *Learning through practice: models, traditions, orientations and approaches* (pp. 36-58). London , UK: Springer.

- Eraut, M., & Hirsh, W. (2010). *The significance of workplace learning for individuals, groups and organizations*. SKOPE (Oxford and Cardiff Universities), Economic and social research council.
- Ferm, L. (2021). *Vocational students' agency in identity formation as industrial workers*. Unpublished PhD thesis, Linköping University, Department of Behavioural Sciences and Learning, Linköping.
- Ferm, L., Thunqvist, D. P., Svensson, L., & Gustavsson, M. (2019). Vocational students' identity formation in relation to vocations in the Swedish industrial sector. *Nordic Journal of Vocational Education and Training*, 9(2), 91–111.
- Fjellström, M., & Kristmansson, P. (2016). Learning as an apprentice in Sweden: A comparative study on affordances for vocational learning in school and work life apprentice education. *Education + Training*, 58(6), 629 - 642.
- Gessler, M. (2019). Concepts of Apprenticeship: Strengths, Weaknesses, and Pitfalls. In M. Simon, M. Martin, P. Joy, & S. Rebecca (Eds.), *Handbook of Vocational Education and Training: Developments in the Changing World of Work*. Springer. doi:10.1007/978-3-319-94532-3_94
- Goh, A. Y. (2013). The significance of social relationships in learning to become a vocational and technical education teacher: a case study of three individuals. *Studies in Continuing Education*, 35(3), 366-378. doi:10.1080/0158037X.2013.770390
- Goh, A. Y. (2022). Learning journey: Conceptualising “change over time” as a dimension of workplace learning. *International Review of Education*, 68, 81–100. doi:10.1007/s11159-022-09942-0
- Goh, A. Y., & Zukas, M. (2016). Student vocational teachers: the significance of individual positions in workplace learning. *Journal of Vocational Education & Training*, 1-15. doi:10.1080/13636820.2016.1172661
- Hodkinson, P., Biesta, G., & James, D. (2008). Understanding Learning Culturally: Overcoming the Dualism Between Social and Individual Views of Learning. *Vocations and Learning*, 1, 27–47. doi:10.1007/s12186-007-9001-y
- Höjlund, G. (2013). Vocational skills formation in the informal economy in Tanzania. In S. Akoojee, P. Gonon, U. Hauschildt, & C. Hofmann (Ed.), *5th International Conference of the International Network on Innovative Apprenticeship (INAP)*, (pp. 133-136). Johannesburg.
- Iftikhar, R., & Lions, C. (2022). Interorganizational knowledge sharing barriers and enablers: the case of Peshawar Bus Rapid Transit project. *International Journal of Managing Projects in Business*, 15(5), 769-792. doi:10.1108/IJMPB-11-2021-0313
- Jaarsma, T., Maat, H., Richards, P., & Wals, A. (2011). The role of materiality in apprenticeships: the case of the Suame Magazine, Kumasi, Ghana. *Journal of vocational education and training*, 63(3), 439-449.
- Kerzner, H. (2017). *Project Management: A Systems Approach to Planning, Scheduling, and Controlling* (12th ed.). Hoboken : Wiley & Sons Incorporation.
- Kolb, D. A. (2015). *Experiential learning: experience as a source of learning and development* (Second ed. ed.). New Jersey: Pearson education.
- Kubberød, E., & Pettersen, I. B. (2018). The role of peripherality in students' entrepreneurial learning. *Education + Training*, 60(1), 2-15. doi:10.1108/ET-06-2016-0106

- Lave, J., & Wenger, E. (1991). *Situated learning legitimate peripheral participation*. Cambridge: Cambridge University Press.
- Levett-Jones, T., Lathlean, J., Higgins, I., & McMillan, M. (2009). Staff – student relationships and their impact on nursing students’ belongingness and learning. *Journal of advanced nursing*, 65(2), 316–324. doi:10.1111/j.1365-2648.2008.04865.x
- Littlejohn, A., Milligan, C., Fontana, R. P., & Margaryan, A. (2016). Professional learning through everyday work: How finance professionals self-regulate their learning. *Vocations and Learning*. doi:10.1007/s12186-015-9144-1
- Liu, Y., & Xu, Y. (2013). The trajectory of learning in a teacher community of practice: a narrative inquiry of a language teacher’s identity in the workplace. *Research Papers in Education*, 28(2), 176–195. doi:10.1080/02671522.2011.610899
- Lyngsnes, K. M., & Rismark, M. (2018). Trajectories through Vocational Education and Training. *International Journal of Learning, Teaching and Educational Research*, 17(11), 175–193. doi:10.26803/ijlter.17.11.11
- Merriam, S. B. (2018). Adult learning theory: evolution and future directions. In K. Illeris, & K. Illeris (Ed.), *Contemporary theories of learning: learning theorist in their own words* (Second ed.). London, UK: Routledge.
- Metso, S. (2014). Vocational students' perspective of organizational factors enhancing workplace learning. *Education + training*, 56(5), 381–396.
- Palesy, D., & Billet, S. (2017). Learning occupational practice in the absence of expert guidance: the agentic action of Australian home care workers. In M. Goller, & S. Paloniemi (eds.), *Agency at work: professional and practice-based* (pp. 271–289). Springer international publishing.
- Rintala, H., & Nokelainen, P. (2020). Vocational Education and Learners’ Experienced Workplace Curriculum. *Vocations and Learning*, 13, 113–130. doi:10.1007/s12186-019-09229-w
- Sappa, V., & Aprea, C. (2014). Conceptions of Connectivity: How Swiss Teachers, Trainers and Apprentices Perceive Vocational Learning and Teaching Across Different Learning Sites. *Vocations and Learning*. doi:10.1007/s12186-014-9115-y
- Sappa, V., Choy, S., & Aprea, C. (2016). Stakeholders’ conceptions of connecting learning at different sites in two national VET systems. *Journal of vocational education & training*, 68(3), 283–301.
- Schaap, H., Baartman, L., & de Bruijn, E. (2012). Students’ learning processes during school-based learning and workplace learning in vocational education: A review. *Vocations and learning*, 5(DOI 10.1007/s12186-011-9069-2), 99–117.
- Tanggaard, L. (2007). Learning at trade vocational school and learning at work: boundary crossing in apprentices' everyday life. *Journal of education and work*, 20(5), 453–466.
- Teal, F. (2016). Are apprenticeships beneficial in sub-Saharan Africa? doi:doi: 10.15185/izawol.268
- URT. (2014). *Education and training policy*. Dar es Salaam: Ministry of education and vocational training.



- Wakkee, I., Hoestenbergh, K., & Mwasalwiba, E. (2018). Capability, social capital and opportunity-driven graduate entrepreneurship in Tanzania. *Journal of small business and enterprise development*, 25(4), 554-572.
- Wenger, E. (1998). *Communities of Practice: Learning, Meaning and Identity*. Cambridge : Cambridge University Press .
- Wenger, E. (2010). Communities of practice and social learning systems: The carrier of a concept. In C. Blackmore (Ed.), *Social learning systems and communities of practice* (pp. 179–198). London: Springer.

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