# Constructing and Practicing Vocational Knowledge at Workplace

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**Abstract:** *Vocational Education and Training (VET) is currently viewed as a tool for socio-economic development. This research paper examines how individuals construct vocational knowledge by engaging in practice in particular social settings, and how the influence of those circumstances is mediated by individuals' prior knowledge premised on their personal histories. In order to achieve these objectives, the paper provides an overview of forms of knowledge which are goals of vocational Education and Training. This is followed by an account of sources of knowledge synthesized from the socio-cultural literature. This is a brief description of a study which examined how vocational knowledge is constructed by individuals participating in three different settings and the findings reported. It is concluded that vocational knowledge is constructed from history, community and ontogeny through micro genetic development. Finally, implications for vocational education and training are advanced.*

**Key words**: Vocational knowledge sources, social settings, personal histories, ontogeny, vocational training centres**.**

## INTRODUCTION

Significant question remain to be answered about the origins and source of vocational knowledge and how individuals access and construct the knowledge. The Vygotskian constructive perspective holds that knowledge has socio-historical origins and is appropriated by individuals through interpersonal (proximal) guidance, or through more indirect (distal) forms of social guidance within social practice (Vygotsky, 1978, quoted by Scribner and Beach, 2004). It is a held that, an inter-psychological process, between individuals and social sources, precedes the appropriation of intra-psychological attributes which grant facility of thinking and acting. However, appropriation is not the mere internalization of externally derived knowledge. Rather it is an active process of individuals interpretatively constructing knowledge based on their existing knowledge structures (Rogoff, 1995).

This process is likened to individuals' search for viability as they seek to integrate what they experience with their existing knowledge structures. Furthermore, it is held that, initially, individuals'construction of knowledge is idiosyncratic. Newman et al (2000) contend that if individuals' construction of knowledge were the same there would be little need to communicate. Instead, it is through ongoing social mediation within the social circumstances associated with knowledge's deployment that the structuring of knowledge is likely to become more coherent, congruent and communicable. These claims pose important questions for the way that social

mediation organizes the structuring and development of vocational knowledge (Luria, 2006),

The general objective of the study was to investigate the construction and practice of vocational knowledge. The Specific objectives were: (i) To examine how vocational knowledge is constructed by individuals participating in different settings. (ii) To assess the extent to which construction of vocational knowledge is influenced by individuals' prior knowledge which is underpinned by their personal histories.

## LITERATURE REVIEW
### Forms of Knowledge
In this section forms of knowledge which are commonly referred to within cognitive psychology are delineated and, in addition, 'non-cognitive dispositions are advanced as being central to the development of these cognitive structures in vocational settings. Cognitive structures are usually viewed as being the representation of knowledge in memory which interacts to secure goals during cognitive activities, such as problem-solving or transfer (Stevenson et al, 2001). These structures, developed over time, provide a foundation for expert performance. Learning, transfer and problem-solving are associated with testing and modifying cognitive structures (Glaser, 2006). The usual distinction within cognitive structures is that between conceptual (propositional) and procedural forms of knowledge. However, it is proposed that deliberations about cognitive structures need also to account for dispositions which comprise interest, values and attitudes (Gardner, 1990) and which are usually viewed as being; non'-cognitive attributes. It is advanced below that the cognitive structures and their deployment are inherently dispositional (Perkins et al, 2008). These forms of knowledge are now described in more detail.

Propositional knowledge or knowledge 'that' (Prost, 2008), also termed declarative knowledge (Anderson, 2005), comprises facts, information assertions, concepts and propositions. A base of conceptual knowledge provides a foundation for adaptable thinking and acting. Complexity of propositional knowledge is referred in terms of depth. Deep conceptual understanding is the acknowledgement of the possession of complex conceptual understanding and includes the strength of associations among concepts (Howel, 2006). In light of this, procedural knowledge is the form of knowledge enabling skillful action (Beston, 200). Also termed 'knowledge how' (Ryle, 1949), procedural knowledge comprises techniques, skills, and the ability to secure goals (Stevenson, 1994).

Procedural knowledge has also been further classified into levels or orders. Stevenson (1991) proposes three levels of orders. First order or specific procedures are employed to achieve specific goals. When non-routine or ill-defined tasks are encountered, specific procedures are not effective being specific to routine situations. Consequently, a conscious monitoring, evaluation and strategy selection procedure, the second order, is invoked. The second order includes procedures, such as those needed for breaking the task up into a series of sub-goals (Greeno and Simon, 2010). The first and second orders are managed by forms of third or higher-order procedural knowledge which act executively upon the lower orders of procedures (Scandura, 2004).

Having considered deepening layers of propositional knowledge and levels of procedural knowledge, a gap becomes apparent in the literature due to the dispositions which underpin these representations. In reviewing Ryle's (2000) which provides categories of knowledge *'that'* and knowledge *'how'* Beanch (2004*)*, noted that some behavior did not fit into either of these categories. How can being pleasant to customers in retail or restaurant setting, or the appropriate level of checking and self-monitoring required of a motor mechanic be categorized. Therefore, it is necessary to examine dispositions which underpin the cognitive structures and their deployment in skillful activity.

Dispositions comprise attitudes, values, affect, interest and identity. Perkins et al **(2008**) conceptualize dispositions, as individuals' tendencies to put their capabilities into action. Although the role of strategic procedural knowledge-knowing how and when to apply knowledge-has been acknowledged (Got, 1989, Evans, 1991), this does not adequately account for dispositions. Strategic knowledge is concerned more with the efficacy of securing goals, than whether the learner thinks they are worth securing, as Goodnow (1990) and, Dweck and Elliot (1990) argue that whether individuals posses the personal confidence or motivation to proceed with the task (Belenky et al, 1986). The distinction between dispositional and strategic knowledge becomes apparent when the issue of values is considered.

According to Greeno and Simon, (2007), dispositions determine whether an individual values a particular form of knowledge enough to be willing to participate in the effortful activity required to secure and then utilize that knowledge, for example, Dweck and Elliott (1990) suggest that students learning vocational education subjects, with a performance task orientation, may determine if participation in a particular skill operation will result in them '*demonstrating competencies*', which is quite a different disposition from those who seek to determine what they will learn from a subject which only theoretical part is learned. The motivation to engage in cognitive activity (performing occupational operation) is different from the view of strategic knowledge which focuses on the efficacy of activity (learning theory in History and Political science subjects), which de-emphasizes the personal and social values which influence learning activities (Janvier, 2007).

 However, rather than advancing dispositions as a separate category of knowledge, they are viewed as underpinning both propositions and procedures (Evans, 2009). These forms of knowledge are therefore viewed as being inherently dispositional. To ignore the role of dispositions is to render these categories of knowledge as being inert, non-problematic or value-free, which thinking and acting are not. Consequently, cognitive structures are held to be underpinned by dispositions. Having discussed these forms of knowledge it is necessary to consider their sources. The socio-cultural literature suggests knowledge is socially sourced and constructed as a social process (Janvier, 2007).

**Source of Knowledge**
Learning, within the Vygotskian view, is conceptualized as being a social and cultural activity, which links the evolving history of the species to individuals'

histories, through the learning of historically derived, culturally generated knowledge. Vygotsky (1987) proposes that complex thinking is derived socio-historically, rather than through individual biological development (Gajat, 2006). However, whereas Vygotsky saw direct interaction between the individual and the evolving social world in learning vocational subjects; others (Scribner, 2008, Rogoff, 1990) have offered hierarchies of practice, which view socio-cultural in origin and suggest that cultures and communities do not progress at the same rate or even in the same directions. This explains employment of participatory approach when determining vocational skills needed by people in different locations.

Rogoff (1990) narrates further that when using examples of counting systems, which utilizes artifacts and symbol systems which are culturally generated, it is possible to demonstrate the attributes of individuals which are transformed by socially-determined thinking processes in learning to count. Therefore, it is held that, as the world is socially constructed, patterns of behavior have their origins in social action and activities (Bagera, 2006). It has been advanced that within any given socio-cultural setting, significant experiences occur in patterned ways and this patterning is a product of socially determined activities. Activity theory, as advanced by Leonteyev (1981) views cognitive and motivational processes as being embedded within large activity structures whose goals they served. Activity is seen as being transformational, as it provides mediation between the individual and the social context, and involves reciprocal interaction and transformations (Vowel, 2008). Activity is therefore held as being an explanatory principle for practice which in turn influences learning and hence, development of vocational knowledge among learners.

Particular communities of practice, such as workplace settings, appear to provide a coherent unit for analyzing the sourcing and appropriation of vocational knowledge. A community of practice is defined as a set of relations among persons, activity and world, over time and in relation to other tangential and overlapping communities of practice. Signaling the centrality of practice to knowing, these writers state that a community of practice is an intrinsic condition for the existence of knowledge, not least because it provides the interpretative support necessary for making sense of its heritage. So workplaces seem to fit the requirements of what is advanced by Lave and Wenger (1991).

The community of practice is shaped by an activity system whose relational elements comprise the social system which underpins practice. The culture of practice comprises the norms and practices of the community (Brown, 2003). It is the culture of practice which determines what knowledge is privileged in particular settings. Therefore, it is held that participation in a particular community of practice offers access to historically derived knowledge which is privileged in certain ways by the community of the practice.

Individuals participate in overlapping communities of practice and appropriate knowledge over time, which is referred to as ontogenetic development, or changes in thinking arising from the history of individuals. Participation in particular practice is viewed here as a form of continuous learning through problem-solving referred to as

micro-genetic development (Glaser, 1989). Micro-genetic development is viewed as the moment by moment learning that occurs through participation in the goal-directed activity of problem-solving. This problem-solving is both routine and non-routine which together are generative of new cognitive structures and their reinforcement through everyday practice (Luria, 2006).

In order to appraise these theoretical concepts, a study was undertaken to determine how participating in communities of practice shape vocational practitioners' representation of knowledge and approaches to solve problems. A brief description of the study and its findings now follows.

## RESEARCH METHODOLOGY

The investigation comprised a study of same vocational practice occurring in three different settings using an *ethnographic* design of investigation into the activity systems within the settings and also the personal histories of the vocational practitioners. Hypothetical conceptual framework was designed after determining dependent and independent variables. The respondents responded to a set of identical vocational training and practice problems through personal interviews and responses were validated through reviewing documents. In this study hairdressing was selected as vocational subject and setting.  Hairdressing salons (10) were purposively selected from Ilala (3), Temeke (3) and Kinondoni (4).

From a population of 125 hairdressers, 40 hairdressers were sampled (randomly and purposively) and that ensured 10% viability as well as +/-5% margin error (*confidence level).* Among 40 hairdressers, 15 were apprentices in the final stage of their indenture. In order to secure a rich understanding of individuals' structuring of knowledge a series of ill-defined problems were used. These type of problems are more complex than well-defined problems, as in the former, the start state is vague and goal state unclear, and operations required to change start state to goal state are also unclear (Chi et al, 1988).

These types of problems are viewed as being particularly valid for inquiry of the acquisition of vocational knowledge because problem situations in vocational training and occupational operations are often ill-structured, with the solver having to construct the goals (Gott, 1989). Knowing which representations provide a great deal of knowledge about the psychology of solver Greeno and Simon (2010) propose that problem-solving task involves three forms of knowledge; problems-solving operators (procedures); perceptual concepts for patterns recognition (concepts), they argue that in the task of problem-solving these forms of knowledge perform interdependent functions. Those undertaking occupational task (procedures) respond to concepts (theories, postulates and definitions) which are used to justify steps in solution search. Strategic knowledge sets goals that organize problem-solving activity operating in an executive capacity (Evans, 2009).

Content analysis method was used to analyze data whereby responses from respondents were compared to identify similarities and differences. This task resulted into getting small portions of data which were easy to manage with regard to analysis.

**FINDINGS AND ANALYSIS OF DATA**

The findings of the study (personal interviews) revealed both similarities and differences in the respondents' responses to problem-solving activity. Patterns of consistency was discernible in the responses across all settings for some specific procedures and those with a more general application, as well as concepts of both a general and more specific form. For example, 25 respondents (62.5%), regardless of setting, referred to using similar goals and procedures to guide their overall practice when undertaking occupational operations in hairdressing.

The initial formulations of goals, which can be viewed as the start state of the problem, were quite similar. For example, when confronted by a photograph of a particular client all 40 respondents (100%), regardless of their salon locations, conceptualized aspects of the problem in a similar way. The hairdressers 18(45%) used face shape, condition of the hair or balance of the existing haircut to generate quite different goals for the treatment. The analysis of this data indicated 9 respondents were from llala, 5 and 4 respondents were from Temeke and Kinondoni respectively. Yet, beyond this the subjects generated quite different goal states, and utilized variations of procedures to secure these goal states.

The formulation of goal states and preference for a particular set of specific skill operation (techniques) were linked to the subjects' participation in a particular area of practice. For example, at 6 salons (60%) that is two in llala, three in Kinondoni and one in Temeke there were types of treatments which were privileged at each salon (cut and colour; chemical and colour; neat and tidy). In this regard, there was similarity in the goals and procedures for subjects within each of the settings. Moreover, the details of the goal state and hence choice of procedures appeared to be closely linked to the subjects' preference, which were influenced by their personal histories or ontogenies. This was evidenced by respondents 12 (30% from Temeke, 10 (25%) respondents from Ilala and 18(45%) from Temeke. Given a choice, subjects recommended those treatments which they had reported as proffering or enjoying. The source of these preferences was usually able to be identified in experiences in their ontogenies.

Therefore, it was inferred from the data that some representations were common across all settings, some were consistent within a setting (66%) and some linked to individual's ontogenies (34%). From the analysis of the protocols it is interpreted that the following three sources of knowledge are evident which shape individuals' representation of knowledge. First, there is canonical knowledge which is historically derived and consistent across the settings. This was empirically revealed by 34 respondents (85%). Represented in forms of concepts and procedures they vary from broadly applicable (For example, determine, negotiate and monitor treatment) to very specific undertaking occupational operations (For example, shorten long hair for a change), and from broad conceptualization of hairdressing tasks (For example, goals of client satisfaction or concerns about client's management of hair) to quite specific concepts particular facets of hairdressing (For example balance of cut, size of face).

Second, knowledge privileged within a particular community of practice can be thought of as being an embedded version of the canonical practice of hairdressing.

This data was provided by 10 respondents (25%). These representations are accessible in forms of concepts and procedures, appear to favour certain conceptualization of problems and procedures for securing goals (For example, salon's strategic goals 'change-maker' or 'maintaining clientele' or 'managing demanding clients') emphasis on particular procedures (For example, threaded '*piecey*' styles at one salon) in the form of norms and practices-the culture of practice. Third, the construction of *vocational knowledge* is mediated by individuals' personal histories or ontogenies. This source offers both preferences and dispositions and is accessible in forms of concepts and procedures. Particularly evident were preference for procedures undertaken in occupational operations (techniques) and dis-positionally embedded concepts (For example, some respondents did not like colours or chemicals and avoided offering these treatments).

It was revealed from 9 respondents (22.5%) that the general goals and rules associated with hairdressing (canonical knowledge) appear to provide a start state for problem-solving, however, the development of the problem-space- the array of possibilities-is constrained by the particular socially determined circumstance that is the culture of practice. It is the particular privileging in a given area of practice which appears to present the hairdressers with parameters for the problem-space. This was revealed to be dominant in Kinondoni salon (57%), followed by Ilala (23% and Temeke (20%). The area of vocational practice privileges a range of concepts and procedures as a basis for the problem space, which the subjects interpretatively construct.

Based on the study findings, the idea of privilege at the community level should not be seen as simply a preference for one approach over another. Instead, it refers to how tasks are undertaken and procedures utilized. Furthermore, using their conceptualization based on personal dispositions, respondents select an appropriate solution strategy. This strategy selection was reported as being influenced by the subject's personal history. However, there are two qualifications here. Firstly, given the negotiated nature of hairdressing, the individual hairdresser will not be always able to select a preferred strategy. That is, the hairdresser can recommend a particular approach, the degree to which the client will accept this recommendation is a negotiated one. Secondly, the individuals standing in the place of practice influences the degree by which they were able to exercise their personal preference. According to 13 respondents (32.5%), those who own or manage a salon are more likely to believe that they can exercise their preference than a more peripheral participant, for example, an apprentice.

The significance of these findings is two-fold. First, historically derived socio-cultural knowledge is accessible in particular area of practice. The utilization of this knowledge in a particular area of practice can be seen as the application of a version of historically derived socio-cultural practice, which is privileged and shaped by the community's activity system. Second, the linkages afforded by the particular area of practice between the socio-historic development (For example, Kinondoni and Temeke area) and individual's personal history provide a basis to understand the constructive process of learning as being socially determined in in both immediate circumstances and throughout individual's personal histories.

**DISCUSSION**

Respondents in the salons, regardless of setting, preferred to use similar goals and procedures to guide their overall activities. At the more specific level of the community, they applied similar approaches to handle client complaints and offered a particular pattern of treatments. The initial formulations of goals, which can be viewed as the start state of the problem, are quite similar. Yet, beyond this commonality, the subjects generated quite different goal states and utilized variations of procedures to secure these goal states.

The formulation of goal states and preference for a particular set of specific procedures (techniques) appeared linked to the respondent's participation in a particular community of practice. However, within particular communities of practice, the concepts and procedures exhibited a common characteristic which related to a privileging of activities within the community. As stated earlier, the community of practice determines what is worth doing well, and what is not. Moreover, the details of the goal state and hence choice of procedures appeared to be closely linked to the subject's personal preference. Therefore, there was evidence that history, in the form of canonical knowledge, was evident as was community and ontogeny (Glaser, 2006). In this way, the influence of these forms of social practice has been identified.

In order to account for and interpret these findings in a way that informs about *vocational knowledge* and its development, it is useful to consider the phases of problem-solving in relation to the development of the problem-space constructed by the problem-solver (hairdresser). With ill-defined problems, it is necessary for the solver to also construct and goal state. In this way, the problem space represents the responses to the start state and solutions are generated by how and in what way the solver construes the goal state. The general goal and rules associated with vocational subject (hairdressing) that are commonly stated appeared to provide the start state for problem-solving; these are those canonical elements which are historically sourced.

However, the development of the problem-space-the array of possibilities-is constrained by the particular socially determined practice. The everyday practice, shaped through the activity system, makes demands which influenced the basis of the actual problem space the individual works within. So canonical concepts and procedures (both general and procedural) are accessible and realized in a particular practice. It is the particular privileging in a given area of practice which presents the practitioner with parameters for the problem-space.

Using their own conceptualization based on their personal dispositions, they then select an appropriate solution strategy. This selection strategy is also influenced by their personal histories. All of this would only provide evidence that *knowledge is influenced by a number of social sources*, if it were not for the link between cognitive development and problem solving, as outlined above. Hence, it is inferred from the data that problem-solving activity, which has cognitive consequences is shaped by different social sources.

The findings from this study have indicated ways in which social practice influences mental functions. In doing so it contributes to the unfolding deliberations about the relationship between social sources and individual's thinking and acting. No longer is it possible to consider cognitive activities without consideration of the social and cultural context in which cognitive activity occurs. The circumstances in which the subjects engaged in vocational practice are shaped micro-genetically by social influences which comprise history, community and ontogeny.

As the deployment of knowledge in routine and non-routine problem-solving is equated to learning and, therefore, cognitive development, it is held that the construction of *vocational knowledge* is shaped by circumstances of the problem-solving activity. Subjects constructed and utilized knowledge that is socio-culturally canonical; having a more universal application and also quite specific in application to particular circumstances. What is being suggested is that contrary to criticism of learning situated in one setting developing fragile forms of knowledge, instead general and adaptive representations of both conceptual and procedural knowledge are accessed in these particular settings.

The richness of this access is one determined by privilege, whether robust or brittle knowledge is appropriated, is in part a product of what is privileged in that community. However, what the data infers is that key elements for performance are highly situated (Perkins, Jay. and Tishman, 2008). Hence, there can be no guarantee that transfer from one setting to another will occur. This is likely to be particularly the case if there were greater differences between settings (For example, between a workplace and a vocational Training Centres).

From the findings it is evident that the sources of representations of knowledge are involved in the problem-solving activity (history, community and ontogeny). These sources not only emphasize the social origins of knowledge they provide evidence of the different contributions of different social sources in complex thinking activities. The significance of these findings is firstly, that domains of knowledge and concepts of expert (competent) performance are situated within the circumstances where knowledge is constructed, deployed and expertly judged. Secondly, the goals and means of securing the goals for vocational practice are likely to be shaped by the particular community of practice in which knowledge is acquired and deployed. This may go some way to explain the difficulties associated with transfer of knowledge from one situation to another, particularly when the circumstances are remote (For example, from the training room/vocational college to the workplace). The communities of practice in these settings are quite different, with resulting consequences for the construction and deployment of knowledge. Thirdly, this problem requires that modes of guided learning be considered to assist the closing of the differences between the circumstances where knowledge is acquired and then used.

In summary, the social sourcing of knowledge appears to be, at least, three-fold. There is the evolving socio-historical source of vocational knowledge. This source evolves over time and enjoys mutuality with the situations where this knowledge is applied and transformed. Second, there is the particular circumstance of this

vocational knowledge's application. The way in which that knowledge is privileged is determined by the activity system which defines the culture of practice that is the norms by which practice is conducted. Individuals participating in the particular social circumstances are given access to the socio-historical forms of knowledge, through the activity system which shapes its use in a particular context. However, the third source of knowledge is the individual's ontogeny which provides an imperative recognition among individuals. It is therefore held that the construction of vocational knowledge and individual's cognitive development cannot be fully understood without accounting for history, community and individual's personal histories.

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