Vocational curriculum and pedagogy: An activity theory perspective.

Author
Billett, Stephen

Published
2003

Journal Title
European Educational Research Journal

Copyright Statement
Copyright 2003 Symposium Journals. Please refer to the journal for access to the definitive, published version.

Downloaded from
http://hdl.handle.net/10072/5875

Link to published version
http://www.wwwords.co.uk/eerj/content/pdfs/2/issue2_1.asp#2
Vocational curriculum and pedagogy: An activity theory perspective

Stephen Billett
Griffith University, Australia


Dr Stephen Billett
School of Vocational, Technology and Arts Education
Faculty of Education
Griffith University
Nathan 4111
Australia

Email: s.billett@mailbox.gu.edu.au
Phone 61-7-3875 5855
Fax 61-7-3875 6868

Abstract
This paper advances a scheme that proposes how curriculum goals and content might be conceptualised for vocational education. The scheme is founded in socio-historical activity theory. An account of the social sources of vocational knowledge (sociogeneses) comprising history, culture and situation is discussed to illuminate how both the canonical requirements of vocational practice and its manifestations in actual practice need to be accounted for in curriculum goals and content. Currently, curriculum frameworks for vocational programs focus on the socio-cultural level of practice (e.g. national competencies, national skills standards). Yet, these fail to account for the actual manifestations and requirements of the vocational practice and how judgements are made about performance. An emphasis on practice as a basis for considering curriculum goals and developing adaptable outcomes is proposed.

Vocational knowledge and learning
This paper discusses existing and alternative conceptions of curriculum goals and frameworks for vocational education. Central to the discussion is the need to account for the social genesis of vocational knowledge and the social bases of learning. A conceptual scheme that accounts for the sociogenesis of vocational knowledge is proposed. It comprises historical and socio-cultural sources of vocational knowledge and its ultimate manifestation in particular workplaces. Having described the sources of knowledge and their construction, the implications for vocational curriculum and learning a vocational practice are discussed. The generic kinds of competencies favoured in a number of countries are proposed as reflecting the phylogenetic (evolving history of the species) level of practice, whereas national core curriculum existing in many western countries are representative of practice at the socio-cultural level. However, these focuses are not helpful in understanding the requirements for practice and providing bases for robust or transferable goals for learning. Finally, issues associated with the promotion of learning for vocational practice are discussed.

Vocational curriculum
In many western countries, curriculum frameworks for vocational education remain premised on behavioural accounts of the goals and process of learning. Outcomes-focussed or behavioural curriculum
accounts commonly guide instruction and the assessment of measurable outcomes. Governments, governmental agencies and industry often favour the arrangements. Such outcomes are seen as offering surety in the management of education, teachers and student learning. However, the behavioural intents (e.g. objectives) that measurable outcomes privilege have long been identified as only accounting for superficial learning outcomes (Hogben 1970) and not those that underpin complex performance (Glaser 1989). Curiously, while behavioural measures have been rejected as appropriate for general education, they have been erroneously claimed to have utility for vocational education because its outcomes of ‘vocations’ are held to be measurable and of a lower level than those of schooling (Stenhouse 1975) or those being prepared for by university-hosted vocational courses. Therein resides a key problem for vocational education curriculum and pedagogy. The perception persists that it only needs to account for low levels of outcomes. However, rather than being routine and simple, the demands of work are often highly complex, demanding and far from routine (Billett 2000). Indeed, many of the studies that elaborated the cognitive view of expertise were instances of vocational practices (e.g. Ericsson and Lehmann 1996). These studies identified something of the complexity of human performance. Yet this seems not to have translated into a wider acceptance of complexity of the purposes of vocational education, including the need to respond to the changing requirements of vocational practice and to adapt to variations in work practices within the same occupation.

The cognitive ‘revolution’ had little impact on the standing of vocational education or an elaboration of its purposes. Government policies have largely ignored its contributions. The exception, however, is the widespread interest in identifying, teaching and assessing generic or key competencies that are held to be applicable to every work situation. These competencies include the Mayer Key Competencies in Australia (Mayer 1992) and the SCANS competencies in the USA (The Secretary's Commission on Achieving Necessary Skills, 1992). The cognitive view emphasises human performance capacities premised on their organisation, selection and application, and defines expertise as the quick and clever use of individuals’ cognitive structures (e.g. Glaser 1989). Domains of human activity (e.g. vocations, academic discipline) are promoted as the bases for the organisation, selection and application of knowledge. It is proposed that competence can be understood as the capacity to operate efficiently in one of these domains (e.g. a particular academic discipline or occupational practice). However, securing the bases of adaptability to a wider domain of activities (e.g. far transfer) has largely remained an unrealised goal of the cognitive perspective (Greeno 1997). Rather than being unitary and objectively constituted, domains of human activity have diverse geneses, values and forms, even when an apparently common activity (e.g. occupational practice) is constituted and enacted in particular circumstances. More than adaptability being focused on the skilful manipulation of individual’s knowledge, there is a need to understand something of the diversity of the kinds of practices to which that knowledge might be applied.

Despite this, governments and employer bodies in a number of countries have promoted generic vocational competencies (e.g. SCANS 1992, Mayer 1992) as being applicable across workplace activities. However, such measures seem to be neither effective nor realistic. What constitutes the knowledge
required for performance and bases for judgements about performance have situational geneses, as well as those reflecting broader cultural needs (e.g. occupations). The broader the generic competency (e.g. problem-solving or team work) the less it is likely to be useful, except at the most general level (i.e. look before you leap, think before you act) (Evans 1993). To be effective, these kinds of competencies have to be embedded in a particular context. Proposing problem-solving as a generic process, not requiring detailed knowledge of the situation where the activities are to be enacted and the kinds of solutions that are acceptable, is fanciful and flawed. It also counters what has been long argued about the domain-specificity of expert performance (Chi, Glaser et al. 1982; Gelman and Greeno 1989; Ericsson and Lehmann 1996). Rather than identifying transferable meta-skills it seems quite specific procedures and concepts are more likely to transfer. For instance, the capacity to touch-type or use a keyboard transcends domains of human activity (e.g. the different kinds of writing required, different software functions). However, more strategic procedures and concepts are probably more resistant to transfer, because the ‘problem-space’ – the range of factors that need to be understood and accounted for – is complex and situationally structured.

Both the cognitive and behavioural perspectives privilege learning as being something largely shaped by individual cognitive processes – their cognitive experience. Yet, both acknowledge social contributions (e.g. the external stimuli and the existence of domains), although their accounts of the relationship between the cognitive and social experience are not clearly developed or articulated (Valsiner and van der Veer 2000). As foreshadowed, the knowledge required for vocational practice is a product of historical development and cultural need with its specific manifestation being shaped by particular sets of situationally-constituted factors (Billett 1998; Billett 2001). What constitutes vocational practice, and what comprises the requirements of and bases for judgements about performance are situational, as well as occupational. Therefore, without a consideration of the situational requirements for work practice and vocational expertise, the account of vocational practice and bases for adaptability are rendered incomplete. Moreover, the different sources of what constitutes practice (i.e. historical, cultural and situational) provide distinct bases to consider vocational education curriculum. These include what might be taken as the goals for vocational education generally and the requirements of a course for a particular vocation, as well as situational requirements for performance. In terms of developing adaptable vocational practice, there is a need to account for some of the situational manifestations of the vocational practice. That is, a focus on practice is required as well as individuals’ cognitive capacities.

Sociogeneses of knowledge

Within sociocultural constructivist theory, the activities individuals engage in, and through which their cognition is shaped, are held to have historical and cultural geneses (Scribner 1985; Rogoff 1990; Cole 1998). Four lines of development or social sources have been advanced by these theorists, comprising the: (i) phylogenetic -- the evolving history of the human species; (ii) sociocultural -- development that reflects a particular cultural need; (iii) microgenetic development -- the moment-by-moment learning that occurs
through individuals’ engagement with the social world; and (v) ontogenetic development -- the evolving base of individuals’ socially constructed knowledge as a product of their life histories. These lines of development have been augmented by a consideration of the situational level of practice, its formation, genesis (Billett 1998; Billett 2001) and manifestation of practice (Suchman 1997).

Phylogenetic sources reflect the growing accumulation of knowledge that arises from human need, evolving cultural need and changing technologies, that are supra-cultural – applicable to many cultural practices (e.g. occupations). These sources influence cultural practice and situational actions. For instance, while there are common concerns underpinning parenting practices, they have different forms across cultures in matters associated with toilet training, sleeping arrangements, parental roles etc (Rogoff 1990). Changes in cultural need, such as concerns about environmental sensitivity, might cause a shift to find non-chemically based hair shaping treatments, and transform motor mechanics’ disposal of waste oils and coolants. So there is an historical legacy in the form of a phylogenetic outcome from the need to address environmental concerns. However, such concerns might play out differently in different cultural practices such as in schooling (e.g. something to be taught), nursing (e.g. the use and disposal of materials), or car mechanics (the recycling and considerate disposal of batteries, tyres, oils and coolants).

Socio-cultural practice is viewed as reflecting cultural need (Scribner 1985) that evolves over time and comprises an identifiable set of practices, values, technologies, norms and practices. Paid vocations (e.g. mechanics, hairdressing) provide examples of socio-cultural practice. Vocations and the kinds of norms and practices practitioners adopt are likely to be the subject of some shared expectations in their host cultures. There are technical and values-based expectations, such as teachers being able to instruct and develop students’ capacities, identify individual student’s strengths and weaknesses and advise parents of their potentials, and deal with students fairly and reasonably. These practices are inseparable from the cultural context, from which they are sourced (Scribner 1985). Socio-cultural practice might transcend a number of countries (e.g. doctoring, nurses, hairdressing) and even have a number of variations within a particular country (e.g. hairdressing and barbering, different styles of cooking).

However, although the product of a cultural need, a sociocultural practice is abstracted from actual practice (i.e. the circumstances where the vocational practice is enacted). There are expectations, goals and procedures that only find tangible form and purpose and are privileged in particular ways when enacted in specific circumstances (Engestrom and Middleton 1996; Billett 2001). These circumstances shape how teaching, barbering, hairdressing, motor mechanics etc is enacted. For instance, how a medical practice is constituted and enacted differs according to its location (e.g. rural town, inner-city suburb, retirement community, remote Aboriginal community), its objects (e.g. characteristics of patients in terms of health, age, dispositions), how the practice is organised (e.g. shared practice, community-based, availability of doctors in rural settings etc.). Therefore, the cultural and historical sources of practice, embodied here as sociocultural practice, are alone unable to account adequately for how vocational practice is constituted (i.e. transformed, privileged and manifested). Accordingly, more than a uniform sociocultural practice,
there is a need to consider the circumstances in which the vocational practice is enacted as they shape its forms and goals.

Activity theorists prompt the consideration of the sources of factors that shapes the activities and interaction, norms and practices at the local level (Scribner 1984; Martin and Scribner 1991; Engestrom and Middleton 1996; Suchman 1997). These factors shape the goal-directed activities in which individuals engage in social practices such as homes (Goodnow 1990; Goodnow 1996) and workplaces (Billet 2001). (Goodnow and Warton 1991) refer to the distribution and expectations of engagement in household tasks being shaped through the interplay between particular cultural values and family situation (i.e. what are considered tasks assignable to males and females). Nevertheless, engagement in and learning from a social practice is not unidirectional. Goodnow (1990) refers to individuals deciding what problems are worth solving when engaging in activities, thereby making decisions about how they engage in tasks from which they learn.

Consequently, individuals’ agency directs their engagement in tasks with their preferences being shaped by their personal histories or ontogenies, which lead to particular ways of knowing and cognitive representations and dispositions (Billett 1997) – their cognitive experience. The array of social practice in which they have participated shape individuals’ ontogenetic development inter-psychologically – between individuals and social sources. This inter-psychological process is enacted microgenetically as individuals’ cognitive experience engages the social experiences they encounter during their life history. Through participation in these activities cognitive change arises at the intersection between the socially-derived activities and ontogenetic bases of actions. Anthropological accounts emphasise practice (Pelissier 1991; Lave 1993), with some conceptualising relations between individuals and cultural practice as the bases for participation in and the formation of identity associated with particular instances of cultural practices (Somerville and Bernoth 2001), referred to by some as communities of practice (Lave and Wenger 1991; Wenger 1998). Therefore, engagement in goal-directed actions derived sociogenetically but manifested by situational factors is held to reciprocally transform, reinforce or refine individuals’ knowledge.

Using the sociogenetic sources outlined above, Figure 1 depicts a view of how individuals’ thinking and acting are reciprocally mediated inter-psychologically through microgenetic actions by engagement in socially constituted activities which are historically, culturally and situationally shaped, on the one hand, and socially derived ontogenies on the other. The knowledge that is historically and culturally sources, is constituted in particular situations where it is encountered by individuals. The individuals’ personal history shaped how what is encountered is engaged with and what changes (cognitive legacy) occurs as a result of that encounter.

FIGURE ONE ABOUT HERE

The consequences for vocational curriculum and pedagogy arising from this scheme are multifold. Potentially, they provide a basis to consider at what levels of practice should the goals for vocational
curriculum be formulated, on what basis should adaptability be considered, what should comprise bases for assessment and how the provision of learning vocational practice best proceeds. These are discussed in the next section.

**Vocational practice, transfer, curriculum and assessment**

**Levels of curriculum goals**

Using the scheme described and depicted above, existing curriculum frameworks and goals for vocational education can be critically appraised. For instance, generic or general competencies, such as those proposed in Mayer (Mayer 1992) or SCANS (1992), can be seen to operate at the phylogenetic level. These reflect requirements that have applicability across a range of vocational (socio-cultural) practices. The processes of numeracy, working with technology, working in teams, problem-solving etc are common requirements of a range of socio-cultural practices. This level of analysis is useful for identifying common requirements for working life, regardless of the particular occupation. Therefore, if the goal for vocational education was to identify these kinds of capacities, the historical level provides a basis for capturing those kinds of outcomes. However, the problem is that these generic competencies are meaningless unless they are embedded in particular activities. As discussed, they are disembedded from both the cultural practice (i.e. the occupation) and the particular workplace. Their manifestation in particular cultural practices is so diverse as to render them problematic as bases for securing performance across sociocultural practices. To take an example, the requirement for problem-solving when icing a cake, cooking a meal, treating a patient are all quite different from those when piloting a plane or teaching a class of students. Consequently, being competent with problem-solving in one vocational practice does not make it applicable to another. The requirements for ‘working in teams’ also have to be understood in the context of the kinds of teams that are to be worked within. If these competences are to be useful, it is important to understand exactly what generic competencies mean in a particular sociocultural practice. Even then, they are remote from the requirements of particular practice. That is, given situational factors, the problem-solving processes and goals of nursing, motor mechanics and teaching will be diverse across hospital wards, garages and classrooms. This means there is a further requirement to understand what these generic competencies mean when manifested in a particular workplace.

The scheme presented in Figure 1 can be used to illuminates the strengths and limitations of national core curriculum. Much of the curriculum documentation is developed at the sociocultural level, as it reflects the needs of the occupation at a national or state level. An account of these requirements (cultural need) is used to identify what is common (thereby presented as core skills that need to be taught) to the practice of the vocation within the country where the curriculum is aimed to be enacted. This process may include the diversity of practices, but in attempting to generate what is common, the variations of practice are often put to one side and seen as aberrations or atypical. For instance, in the Australian national vocational system, these variations are seen as non-endorsed (i.e. non-essential) components of national ‘training packages’. The nationally endorsed components reflect the collective and
aggregated cultural need – the sociocultural level. However, as foreshadowed, it is variations of practice that are more central to the requirements for performance. While workers might be expected to possess a range of historically and culturally derived procedures (e.g. procedures to cut hair, nurse patients, construct buildings, fix cars), the requirements are likely to be determined by situational factors. That is, the kind of hair treatments provided by the salon, whether the nursing is occurring in a country or metropolitan hospital, whether the housing construction in driven by contracted price or quality of required finish, and, whether the car mechanics work is in a metropolitan dealership or a small country garage.

Here, it has been proposed that the canonical knowledge of the vocation may be found at the socio-cultural level, the instances and variations of the sociocultural practice at the situational level and generic competencies are locatable at the phylogenetic level.

Adaptability: An emphasis on practice
The capacity to adapt what has been learnt to different situations is a key benchmark of rich learning and a goal to which vocational education aspires. A consideration of practice offers a basis to promote adaptability, and understand the common failure of transfer (e.g. Raizen 1991). It proposed that high expectation of transfer, as a purely cognitive process, is unreasonable. Instead, learning through participation in practice may have to be re-emphasised. Through understanding something of the diversity of practices constituted under a particular socio-cultural practice (occupation – e.g. nursing, hairdressing) adaptability or transfer of learning needs to be considered from the perspective of social practice. That is, rather than seeking to just develop the capacity to adapt knowledge to operate across the diverse instances of the occupation, it might be more effective to base expectations of transfer on the variations of practice and experiences within those practices.

This approach emphasises learning through participation as much as a reliance on the manipulation of existing knowledge. It seeks to draw on the social as well as the cognitive experience. The aim here is to secure adaptability through experiencing different instances of the sociocultural practice in order to understand something of the diversity of practice. Trainee nurses’ experiences of working in different hospital wards should lead to learning about the scope of nurses’ work. Similarly, a nurse trained in a major teaching hospital spending time in a small rural hospital, and vice versa or in a workplace medical centre, will learn more of different roles that nurses might play. Apprentice cooks might be provided with experiences of work in a range of restaurants, as well as in hospital kitchens or mining or army camp canteens to learn diverse applications of food preparation and service. Car mechanics might be given experiences in both city dealerships and small country town garages in order to broaden their knowledge. These experiences could be used to promote the possibilities for and expectations of adaptability. The nurses, cooks and car mechanics etc. might be encouraged to identify the key principles of their occupation (canonical knowledge) and its procedures in ways that are rich enough to accommodate variations in practice. Learners might be asked to consider the particular requirements of the
different practices in which they have participated in, in order to understand how the vocational practice differs across workplaces. The reason to focus on practice is the failure of the skilful thinking approach to transfer knowledge from one situation or circumstance to another. Cognitive studies of expertise identified that while humans have extensive memories, our processing capacities are more restricted (Chi, et al 1982; Glaser 1989). However, many of the prescriptions flowing from the cognitive view place a reliance on processing capacity, rather than enriching experience. Indeed, it has been shown that school students abandon their knowledge of maths when they are faced with a mathematical task that they do not recognise as a classroom-based mathematical tasks (Scribner 1984; Raizen 1991). So the aim is to use learners’ experiences in different instances of practice to establish bases for understanding the scope of the vocational tasks and approaches to responding to those tasks to be understood as a product of engagement in those practices. Given the significance of microgenetic inter-psychological processes in engaging and extending individuals’ learning, it is likely that practice will best provide the access to and engagement with situational factors and contributions. The combination of instances of practice, when coupled with the learners’ cognitive capacities, may well assist developing robust vocational knowledge.

Nevertheless, extreme instances of practice point to the difficulties associated with transfer to other situations. By promoting the idea of key competencies or adaptability as skilful thinking, quite unrealistic expectations of adaptability may have been generated. As well as variations and permutations of practice, the scope of instances of practice also can render procedures (both specific and strategic) and concepts beyond the knowledge possessed by many practitioners. The hairdressing salon that specialises in Rastafarian hairstyles may have demands for practice beyond those of most hairdressers. Similarly, a specialist restaurant (e.g. vegetarian, ethnic) may be beyond the scope of many cooks, as will the demands of a garage that specialises in performance vehicles be for many mechanics. In some occupational classifications, such variations are acknowledged as specialisations. Here, different expectations about practice are often exercised. Similarly, technological change can render existing knowledge obsolete thereby transforming the requirements for performance. The emergence of new technologies and work activities is not necessarily directly aligned to the technologies and tasks they replace. So some understanding of the variations of practice may lead to a de-emphasis of the canonical view as being the most useful. Instead, a view that elaborates, champions and illuminates the diversity of vocational competence should come to the fore.

The scheme outlined in Figure 1 provides a way of identifying the issue of adaptability in terms of practice. It places learning, participation and practice at the centre of a consideration of developing adaptability. In Figure 2, these ideas are used to conceptualise current approaches to vocational education and educational institutions. In the right column, the concept of the vocation is elaborated at the phylogenetic, sociocultural and situational levels of practice. In the left column are the depictions of the alignment of educational institutions and practice to these levels of sociogeneses. At the phylogenetic level are the need for vocational education and the broad intents, such as the overly ambitious and
Learning vocational knowledge

The discussions above pose important questions about the goals for and the processes of instruction. Among these is the basis by which transfer should be conceptualised to account for vocational settings and situations. In particular, the substitute environment of the educational institution may provide inter-psychological experiences that are so remote from actual practice as to render them only weakly adaptable to other circumstances. This is not to suggest ‘de-schooling’. Instead, it acknowledges the importance of situational contributions and the necessity to be wary of the cognitive consequences of participating in an environment that is remote from those in which the knowledge to be learnt is applied. Central to learning as inter-psychological processes are the kinds of activities and interactions that individuals can engage in. The goal-directed activities have social and cultural geneses and have a cognitive legacy. The kinds of activities and their qualities likely shape learning. For instance, activities that are authentic in terms of the kinds of activities to be learnt may have a stronger and more applicable outcome than those which are substitute, given the array of social contributions (Raizen 1991). Similarly, the interactions with others and the social world can enrich the learning experience or simply assist in the learning of hard-to-learn knowledge that would otherwise would not occur. This then leads to a consideration of the important role of experiences in vocational colleges mediating experiences gained elsewhere. At least two premises for instruction arise here. Firstly, how variations in the same sociocultural practice can best be understood; and secondly, the likely interest of an individual to engage in transfer to another and different constituted practice. These are briefly referred to here, but warrant greater elaboration.

Taking the first, instruction or deliberate interventions to assist learning might be ideally directed to furnishing the kinds of experiences that will permit practice in different instances of the vocation to be learnt. This will be supported by intentional activities that can be drawn out of the diversity of students’ experiences in order to develop an understanding of the diversity of instances that comprise the vocational practice. However, being realistic, it is unlikely that all students will be able to engage in multiple instances of practice. Yet, in any group of individuals from the same vocational practice there will be a diverse base of experiences to draw upon to tease out both the canonical and the particular. This body of experience can be engaged and shared to build the repertoire of experiences and identify the diversity of
practice, competence and bases for effective work performance. Secondly, there also needs to be some accommodation of the kind of bases by which students will be interested to engage in particular variations of practice, and are likely to direct their energies to learn richly in that environment. One consideration here is to emphasis the virtues of the richness of different kinds of practice, rather than proposing some as being more high status. For instance, in emphasising the particular requirements for catering in remote mining communities or the social contributions that hairdressers make to the lives of their elderly clients may overcome some of the privileging of particular fashionable practices in hospitality and hairdressing.

**Practice, learning and vocations**

In summary, propositions about curriculum goals and content for vocational education have been advanced here for critical appraisal. It has been argued that, in order to improve the kinds of experiences and outcomes that are provided to its students or learners, the bases of the goals and content of curriculum and instruction for vocational learning may need to be revised. Given that the knowledge to be learnt is socially-sourced, yet there are distinct social contributions to that learning, these contributions need to be understood and aligned to key concepts and practices that are guiding vocational education. Within this critique the need to identify social practice as something that is enacted, as well as something existing as an abstracted expression of cultural need, has been proposed. Also, given the inter-psychological contributions to human cognition, the kinds and quality of encounters with the social world have been emphasised. Mechanisms such as general or key competencies have been proposed as having most purchase at the phylogenetic level, but are too abstracted to be useful at the applied level. Similarly, national curriculum frameworks and documentation need to be understood as an expression of national need, rather than something able to account for the diversity of vocational practice within a country. That is why a more situational approach to curriculum development and framing of goals and content is required.

The ideas presented briefly above warrant greater elaboration, qualification and, importantly, critical appraisal which, it is hoped, will arise from their tentative airing here.

**References**


Figure 1  Sociogeneses of vocational practice

**Phylogenetic (the evolving history of the species)**
- Wertsch 1985, Scribner 1985
- Provides guiding concepts and procedures that are supra-cultural

**Socio-cultural practice** (Scribner 1985)
- Historically derived, transformed by evolving cultural needs and constituted as sociocultural practice
- ‘legacy for individuals in terms of technology, such as literacy, numbers systems, value systems, scripts and norms’ (Rogoff 1990: 32).

- How sociocultural practice is constituted through being embedded in an activity system; (Engestrom 1993), local negotiations and interactions (Engestrom & Middleton 1996) and local ordering of tasks and artefacts (Suchman 1997), thereby privileging certain forms of knowledge e.g. hairdressing salon or doctor’s surgery shapes how activities and goals are constituted in practice.

**Microgenetic interactions and development** (Rogoff 1990; Scribner 1985)
- Individual's construction of socially derived knowledge through routine and non-routine problem-solving - which transforms and co-constructs knowledge (appropriation).

**Ontogenetic development** (Scribner 1985)
- Ongoing product of microgenetic development which contributes to individuals’ ontogenetic development -- (‘life history of the individual’ Scribner 1985), ‘the change in thinking and behaving arising in the history of individuals’ (Rogoff 1990, p. 32) mediates goal-direct activity.
Figure 2  Sociogeneses of vocational practice, transfer, curriculum and assessment

<table>
<thead>
<tr>
<th>Vocational education</th>
<th>Vocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need for education and educational institutions. Key vocational competencies that have applicability in diverse cultural practices.</td>
<td>Need for certain human activities (e.g. client service) leads to development of procedural and conceptual tools (e.g. calculations and a number system).</td>
</tr>
<tr>
<td>Manifestation of a particular vocational educational system. Core vocational industry-wide competencies.</td>
<td>Vocations developed as a result of particular sociocultural need (particular uses and methods of vocation e.g. hairdressers, doctors, nurses, lighthouse keepers).</td>
</tr>
<tr>
<td>A particular vocational college or program. Range of situational factors that shape institutions (both educational and workplace).</td>
<td>A particular vocational practice (e.g. hairdressing salon, doctors' surgery, a particular lighthouse)</td>
</tr>
</tbody>
</table>

**Phylogenetic (supra-cultural)** (Wertsch 1985; Scribner 1985) Guiding concepts and procedures

**Socio-cultural practice** (Scribner 1985) Historically derived knowledge transformed by cultural needs and constituted as sociocultural practice

**Situated practice** (Lave & Wenger 1991) Particular socio-cultural practice constituted by a complex of circumstantial social factors (activity system) norms and values which embody the community - culture of practice (Brown, et al. 1989)

**Microgenic level** (Rogoff 1990; Scribner 1985) Individual's construction of socially derived knowledge through routine and non-routine problem-solving -which transforms and co-constructs knowledge (appropriation).

** Ontogenetic development** (Scribner 1985) Individuals' personal histories - including participating in overlapping communities