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The role of materiality in apprenticeships: the case of the Suame Magazine, Kumasi, Ghana

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Although the concept of the apprenticeship seems to be universal, its institutional form and status differ around the world. This article discusses informal apprenticeship training as it occurs among car mechanics in the informal industrial complex of the Suame Magazine, Kumasi, Ghana. Using on-site research and theories of social learning and material culture, it focuses on the material aspects of the apprenticeship training and shows that materiality is, in multiple ways, a crucial aspect for both the content and learning practices of the apprenticeship system. The material nature of the Suame Magazine forms a strong learning environment and the status of apprentices is also directly related to the mastering of specific car parts. Moreover, the increasing use of electronics in vehicles demands a different curriculum for apprentices. The role of materiality in social learning is an apparent, though understudied, element in apprenticeship systems.

Keywords: apprenticeship; materiality; situated learning; Ghana

Introduction

Mr Oti points towards a carcass of a minivan. It is one of the kind that is widely used as a *trotro* (minibus) in the Ghanaian cities. This one in particular, however, is lightyears away from an active life. It has no windows, no doors, no seats or any interior at all. The engine and gearbox are missing too. Yet, a welder is working on its body. 'They are completely rebuilding it,' Mr Oti explains. 'It has been here for five years already, now the owner has collected the money.' The researcher takes another look at what once was a minivan. 'So when do you guys give up on a vehicle?' he asks. 'We don't,' Mr Oti replies. 'As long as the owner can pay for the work, we will do it.' Mr Oti is a mechanic and zonal chairman in the informal industrial complex Suame Magazine, situated in Kumasi, Ghana. In the Suame Magazine, an estimated 200,000 artisans work in 12,000 enterprises, mainly related to auto repair. A key factor in the functioning of the Suame Magazine is the employment and training of apprentices. These apprentices form the backbone of most of the activities in the vast number of workshops. In other words, on-the-job training of car mechanics is tightly interwoven with the social structure of Suame Magazine. This article presents how the apprenticeship system of Suame Magazine operates and thereby emphasises the role of the material environment. The topography of the area, the physical characteristics of cars, and the use of tools and other equipment all affect the activities in Suame Magazine. Thus, we argue that apprenticeship learning is as much a material process as it is a social process. Understanding the role of the material environment and how apprentices and others interact with the material environment therefore needs to be considered in apprenticeship studies.

The origins of the Suame Magazine go as far back as the 1920s when blacksmiths started to shift their attention from carriages to cars. They started forging broken springs and clustered themselves around the arms depot of the British colonial army, which is where the name *Magazine* originates from. Ever since the 1950s, the Magazine has been situated in Suame, a northern suburb of Kumasi. The population of the Suame Magazine increased rapidly in the 1970s when auto-mobility reached Africa, spurred by a general increase of economic activity in the first decades after independence (Dawson 1988, 21, in McCormick 1998, 27; Arthur 2001, 89). The emergence of industrial areas like Suame Magazine coincided with a process of urbanisation. The apprenticeship system thus offered newcomers in Kumasi an opportunity to get a job (Powell 1995, 2–6).

Over the 90 years since its emergence, Suame Magazine has become the heart of Ghanaian car repair. Not only has the Magazine developed into a vast industrial site with an estimated 200,000 workers, it also forms the historical backbone of informal car mechanics. For example, the council of elders of the Ghana National Association of Garages (GNAG) with its head office in the capital Accra, is formed entirely by Magazine mechanics. The Suame Magazine has also been involved in several other initiatives like the *Ghana can make it* exhibition in 1983, the foundation of Intermediate Technology Transfer Units (ITTUs), and the US-based Millennium Cities Initiative of the Earth Institute of Columbia University.

Although getting a vehicle back on the road is the objective of all forms of auto repair, Ghana's Suame Magazine and similar car mechanics clusters in developing countries constitute a very different practice from car repair in an average garage in the western world. Cars are being *tropicalised* with the help of a considerable amount of creativity and homemade parts, sometimes to the horror of western customers (Verrips and Meyer 2001). Moreover, scrap heaps for cars are nowhere to be found. Cars are either brought back to life, often from conditions ostensibly far beyond repair, or cannibalised. Obviously, this is a result of the circumstances. There is no large-scale car production in Ghana, meaning cars have to be imported from overseas. Imported new cars can be afforded by the elite but the majority of the Ghanaian fleet consists of secondhand cars shipped over from western Europe. Similarly, the local stock of spare parts is built up primarily from cannibalising wrecked or otherwise unused vehicles. These material conditions in combination with the absence of officially licenced car dealers or other forms of market regulation create the right environment for the emergence of car-repair workshops as clustered in the Suame Magazine.

The same conditions demand a custom training routine for new car mechanics. Although Ghana has, for African standards, a reasonably functioning school system, entering young people into the apprenticeship system is attractive for its low costs. Moreover, much of the required expertise is only indirectly related to car repair and involve a variety of skills for being able to work and live in the Magazine. Being able to move around in the Magazine, with its many workshops, specialisations, nodes and connections, and interacting with other mechanics, parts dealers and other actors in the Magazine, form an essential part of the curriculum of a mechanic in training. Such knowledge and skills are not necessarily best obtained through formal education. Or, as Bas (1989) puts it: 'the school system frequently proved incapable of transmitting the skills, attitudes and know-how that young people need to enter the labour force'. The apprenticeship training in the Suame Magazine involves a highly social and situated form of learning that is different from more formally organised apprenticeships as they exist in western countries. Apprenticeship training in Africa has been described by several authors (including McLaughlin 1979; Lave and Wenger 1991; Breyer 2007; Palmer 2007) with a predominant focus on the social nature of learning. In this paper an additional point is made about the importance of materiality in the apprenticeship system of the Suame Magazine. Several scholars have recently focused on materiality (see Mellström 2002; Porcello 2004; Sennett 2008), but remain rather implicit as to how material objects play a role in social interaction and learning. The findings of this study point out that the materiality of the Suame Magazine is decisive for how apprentices are trained as well as for what they are trained in. In what follows we will build on existing literature in this domain and complement this with insights from studies that have focused more explicitly on the role of materiality in social interaction. These insights appear helpful to understand the work activities and the way apprentices operate in the Suame Magazine. In the last section we will draw some conclusions on what this implies for looking at apprenticeship systems in other places.

The case material was collected during ten weeks of participant observation and interviewing in the Suame Magazine by the first author. Research on the apprenticeship itself was done mostly at the level of individual workshops throughout the entire Magazine. A total of 21 workshops were selected randomly and concentrated mainly

on car mechanics. Consequently, less attention was given to the activities of spray painters, welders, upholsterers and other accommodating work.

Interviewing and observation were the most used methods for data gathering within the workshop. In addition, the occasional filming took place to be able to properly analyse the material nature of the Magazine, particularly to capture the non-verbal nature of the work. Several apprentices, or groups of master and apprentices collaborating on a certain job, were filmed. Reviewing the footage appeared to be a useful way to understand the bodily component of car repair, employed by individuals, and the bodily positioning and interaction within teams. The mechanisms behind the Suame Magazine as a social system were mostly studied through interviews with masters, zonal chairmen, union board members, and through the few available written resources. Observational data were helpful to get a 'full picture' about the information provided by the informants but also provided insight in activities which are difficult to describe in words or are considered too obvious to mention.

Learning in a material environment

Since the 1990s there has been growing interest in apprenticeship learning for the education policies of western nations. Most studies supporting this trend focus on the comparative value between in-school learning and on-the-job learning (Butler and Brooker 1998; Guile and Young 1998; Steedman 2001; Machin and Vignoles 2006). Governments wish to strengthen the skill base of their future work force as the quality of labour is considered as important as quantity. Job mobility and flexibility of the labour force are put forward as important ingredients for economic competitiveness, supported by notions of retraining and lifelong learning (Guile and Young 1998, 173). These goals are believed to be achieved by revitalising the apprenticeship system (Fuller and Unwin 1998). Consequently, the apprenticeship system is considered a supplement to formal education.

In the African context, this seems to be almost the opposite. Particularly in Ghana, only 30% of the youngsters are able to further their education following junior secondary school (Palmer 2007, 252). The majority of them find employment in what Keith Hart (1973) called the informal economy, in which a large part of the professional education exists mainly as apprentice learning or other forms of learning-by-doing. That, however, does not imply that professional training is disconnected from other forms of education.

Today, few educators will deny that learning is as much a social activity as a cognitive process. Interactions between teacher and students, group work, and peer learning are all an integral part of most school curricula in western nations. Social learning (Wals 2007) is also a key element of apprenticeship training. The trainee is supposed to perform certain tasks and learn how to interact with others in the firm or organisation, discover formal and informal rules of conduct and behaviour, and the level of flexibility and variation of social interaction. Based on a number of studies of learning in practical situations, anthropologist Jean Lave emphasised that the specific conditions of the situation shape how social interaction and learning take place. Together with educational theorist Etienne Wenger she introduced the notion of legitimate peripheral participation, indicating how learning involves a process of moving from the periphery of a setting to the point where one becomes a fully accepted member of a professional community (Lave and Wenger 1991). This notion is particularly useful for understanding apprenticeships (it has often been used in relation to apprenticeships, see for instance: Fuller and Unwin 1998; Guile and Young 1998; Wallaert-Petre 2001; Brockman 2010). An important notion is that the increased participation of novices is not achieved by the instruction of pupils by the teacher, but by facilitating change in the identity of the learner. The role of the senior participants is not so much transferring knowledge or skills to the apprentice, they primarily serve as intermediates, helping the apprentice to find his or her way in the community of practice by direct guidance or, more indirectly, through being observed by them.

The emphasis on the situated nature of apprenticeship systems suggests the important

role of the material conditions. A first expression of material components in situated learning is the physical lay-out of the learning environment. Lave's (1996) work on supermarket shopping addresses the differences between how people deal with mathematical problems in a classroom setting and in a real-life setting, showing the importance of the actual situation in calculation. As most people solved similar mathematical problems much better in the supermarket itself than on paper in the classroom, this, according to Lave, underlines that 'activity is mutually constituted with the setting in which it takes place in a vitally integrated way' (Lave 1986, 97). The importance of the material setting includes the use of technical objects. The interaction between people and technical objects is a field in itself and many of these studies look at cases in which the interaction fails, in order to show the mutual dependence between people and things. For example, Akrich (1992) shows how solar energy kits introduced in West Africa were used very differently than envisioned by the French engineers who designed the kits. Looking more in detail at how material objects form a part of people's activities therefore can reveal important information about the social (and material) fabric. Similarly, Lave and Wenger (1991, 101–3) address what they call the 'technology of practice' as an integral part of the situated learning process. Technology, they argue, is part of the community of practice to understand and engage with, just as one engages in social relations.

The Suame Magazine is a case in point. Many of the workshops have specialised in particular parts of cars, and the geography of the different specialised or general repair workshops is an important element in how the Magazine functions as a social and material unit. Moreover, what particular piece of material, tool, or car part is handled or operated reveals information about the social status, forms of interaction, and the learning process. Within the workshop the hierarchy of apprentices is directly related to the elements of the car that need to be fixed and the required operations (the closer to the engine, the closer to mastery). In other words, learning is about peripheral *material* participation as much as it is about peripheral *social* participation.

Dant (2008) has further specified the role of materiality in social interaction.

Materials and tools play an active role in the interaction process. According to Dant, people interact with material objects by reading them as a set of signs understood in the immediate context of practice within a wider cultural setting. The meaning acquired is not fixed but unfolds when *reading* the object, which Dant defines as interpreting the object's physical and functional characteristics. What Dant calls 'gesture' is the bodily interaction with material objects, such as car parts and tools. This is an activity that not only serves practical purposes but also helps to 'manage perception'. Material interaction implies knowing how to handle the part, who is allowed to handle it, what tool is needed to fix it, and, if necessary, who to ask for assistance. The direct interaction with objects is the situational expression of more general abstract knowledge about the part's particular place and functionality in the car. Thus, perception and gesture are the constituent components of material interaction. 'Most of the time the two channels of relations with objects – perception and gesture – are contiguous, running seamlessly together often without the need for conscious thought that distinguishes them' (Dant 2008, 11).

Within the context of the Suame Magazine, the reading of material objects takes place at all levels. Although a division of labour is clearly present, car repair is the key activity to which all other activities are directly related. Masters, although busy dealing with customers, suppliers and other managerial tasks, maintain an active role in repair activities. They will keep interacting with the materiality of cars throughout their whole career, whether they advance in organisational terms or not. Even within the several professional associations, officials higher up in the organisation have a functioning workshop to look after. Interviewing union leaders and higher officials of the organisations thus usually implied talking to men in overalls in their workshop.

The apprentice in the Suame Magazine

To become an apprentice in the Suame Magazine, the parents of a young boy settle a deal with a workshop master. The deal involves a training fee, mostly in money, the

amount of which depends on the kind of workshop, the reputation of the master and the financial situation of the parents. Some of the money might be distributed among the apprentices already active, as they will be partly responsible for the boy's training. Once accepted, the necessity to engage with the material environment is pressed upon the new apprentice right from the start. The boy needs to buy some basic tools and work clothes and starts working, probably for about four to seven years. Unlike education in formal schools, the apprenticeship is not tied to a curriculum of a certain number of years: the length depends in the first place on the motivation and capacities of the apprentice. During these years, the apprentice increasingly participates in the social and material milieu of car repair and hence moves upwards in the hierarchy of apprentices. This upward mobility takes several steps, based on skill level and time spent in the workshop (cf. McLaughlin 1979; Palmer 2007).

In general, the *junior* phase of apprenticeship reaches from the very beginning to the stage at which the apprentice can do some of the more basic repairs without guidance. This approximately takes two years. The most important goal of the junior is to get acquainted with the socio-material structure of the Magazine. On a daily level, this means that the junior assists his older co-workers in their work. He fetches tools, collects parts, and cleans the workplace and tools afterwards. He might occasionally be asked to get manually involved in the work, for instance, by holding something in place. While doing so, the junior will learn the basics of the workshop and of the Suame Magazine as a whole. He will get to know the names for tools and parts, his way around in the workshop, the difficulty of the several jobs, and the hierarchy among his colleagues.

A *senior apprentice* is entrusted to work on his own on some of the jobs, selecting one or more juniors to assist him. Therefore, the senior is as much a teacher as a learner. The juniors who were interviewed said to learn at least as much from senior apprentices as from their masters. This is partly for pragmatic reasons: there is work to be done, usually on different vehicles and this simple economic condition does not allow for learning to be the lead activity. The senior thus functions as an *extension* of the master: his level of knowledge and skills are not yet at the same level, but are sufficient to do most of the work and to supervise juniors in these jobs. Besides, seniors are also often entrusted to handle the financial negotiations with clients.

A *chief apprentice* is the senior apprentice who has spent the longest period in the workshop and has a corresponding skill level. The chief apprentice acts as the master's assistant. His skill level is similar and he takes care of the workshop when the master is not there. From this stage, a piece of land with his own workshop is all that keeps him from becoming a master himself.

The apprentices know very well where they are positioned and what title goes with that position: junior, senior, or chief apprentice. However, from the perspective of school-based learning with more or less clear boundaries between the several grades – which was also the researcher's frame of reference – the seemingly unsystematic nature of progression in the Suame apprenticeship is hard to grasp. Interestingly, the hierarchical system is tied to materiality. The different phases are defined by what kind of jobs an apprentice masters and can do without guidance (see also McLaughlin 1979). As soon as a junior fully masters the propeller shaft or the back axle, he can become senior. Ultimately, the gearbox and engine form what in formal education would be final examination. Hence, one could speak of a *material curriculum* along which the apprenticeship is organised.

It is, however, difficult to determine the main factor behind the progression within this curriculum. Is it skill level or career length? The answer seems to be different for every workshop. In general, most of the apprentices and masters agreed that an apprentice's attitude and cognitive capacities – 'how fast his brain is', as many apprentices put it – are decisive for the speed of his progression. He should be serious, hard-working, and eager to learn, taking every opportunity (in the form of work that is offered him) to prove his skilfulness. In general, his skill level would then correspond to the length of time in the workshop. When time and skill level disconnect in a negative sense – the skill level is lower than the time spent in the workshop would

suggest – it is up to the master which of the two weighs more heavily. However, when the title of ‘senior’ is given to an incompetent apprentice out of respect for his age, this title would still be meaningless. The interviewed apprentices declared that in such a situation the apprentice might be called a senior, but the master would send the better performing junior to do the work. This indicates that the hierarchy is based on a combination of age and the level of skills and the performance quality of apprentices. It is the junior’s responsibility to learn and make progress as a participant. In other words, it is a learner’s curriculum (Lave 1991, 97). It is not a teacher who decides what is being taught and how, it is the apprentice, the learner. He has to make sure he gets involved in the work and then do it well to ensure he gets another job. After having observed his co-workers several times, the apprentice would, under supervision, get a chance to take on the simpler jobs, changing tires or adjusting brakes, for example.

As shortly mentioned in the introduction, the ratio between formal education and the apprenticeship system in the Suame Magazine might be opposite to the situation in western countries. However, there are opportunities for Suame apprentices to follow formal education. The Kumasi Technical Institute (KTI) offers a full-time and a part-time programme. The National Vocational Training Institute (NVTI) offers a similar full-time programme in car mechanics. In addition, the NVTI offers the opportunity to formalise skills through certification, by taking a practical exam.

Although many apprentices acknowledged the advantages of, or even the necessity to supplement their practical experience with theoretical knowledge, only about a quarter was in, or had completed KTI or NVTI. The main reason for this small share is that the apprentices said they did not have enough money to pay for the schooling.

Material interaction and car repair

As Lave and Wenger (1991) argue, learning in an apprenticeship is not achieved through central teaching but through facilitating change in the identity of the learner. This change is expressed in an increase in the participation of the apprentice in the community of practice. The start of this participation involves gaining access to this community – to its knowledge, skills, social relations, tools, and so on. In the case of the Suame Magazine, this access is granted in the form of an informal agreement between a master and the apprentice’s parents, combined with the purchase of some tools and clothes. These utensils could be seen as the boy’s key to participate in the material side of the Magazine.

The wider material setting and topography of Suame Magazine is a cluster of shedlike constructions, mostly made out of wood, that function as workshops. These workshops seem to be haphazardly placed, a chaotic network of unpaved roads lying in between them. The actual workshop serves more as a dressing room and storage for parts and tools, than as a workplace. Most of the activities take place in the open.

The open spaces between workshops are filled with malfunctioning cars, disassembled to various levels. Most of these are waiting to be repaired, which happens as soon as the owner has collected enough money to pay for it. Beyond the workshops and the parked cars, the milieu is dominated by car parts, tools, and accessories. It is interesting to see that part of the workshop equipment – vices and wheel barrows used to collect heavy car parts, for example – is made up of used car parts. Cars and car parts thus form most of the physical decor of the Magazine workshops. A basic map with the road structure would be enough for a visitor to move from point A to B but is not enough to move around as an apprentice. Visual recognition of the material topography of cars and car parts distributed over Suame Magazine is a necessary component of the learning process.

Because most of the work takes place in the open, there is a seamless connection between work being done in a workshop and the material topography of the magazine as a whole. The open character of the workshops makes sure that an apprentice learns a lot just by *being* at work and not even necessarily *engaging* in the work. The presence of parts in the direct surroundings of the workshop facilitates introduction of the young apprentice to his working material. However, being in the midst of this

materiality does not provide all the necessary information for the novice. It is the interaction between his co-workers and materiality that is essential here. Not only does this interaction reveal how tools are used and what the necessary actions are to repair the car, it also shows how his co-workers relate to each other.

The task of the junior then is to get acquainted with these sets of relations. The hierarchy among the workers, for example, is reconfirmed by the physical positioning of the workers around the objects that are being worked on. As is shown by the film footage that was collected in the workshops, the worker in charge of the job occupies the central working position. This is often a sitting position, for example on a bench, facing the part that is under construction.

Just to the side, a junior would be standing or squatting down, the work just within or just out of reach. Apparently, it is not necessary for him to be able to lay hands on the work all the time. His job is to be stand-by for the moment whenever the worker in the central position needs a part, a tool, a steadying hand, or any other kind of help. The other part of the job is to watch the work closely and learn.

This is just one example of how basic information about the life in the workshop could be obtained by observation in the workshop. The apprentice gets to know the parts and tools, his co-workers, and the relationships between them. Outside the workshop, when asked to get some parts, for instance, he learns to find his way to dealers, cooperating workshops, and the other services of the Magazine.

The importance of materiality in the apprenticeship system of the Suame Magazine manifests itself in yet another way. The objects and tools are the dominant mode for transmitting information. Whereas language is the most important instructional tool in formal education, informal education leans more on observation (Scribner and Cole 1973). Objects play a crucial role in this observation.

This aspect of materiality as a teaching aid is linked to an argument made by Dant on the importance of tacit knowledge among car mechanics. Dant (2005), observing car mechanics in Britain, notes that manuals and other blueprint solutions are rarely followed by mechanics when confronted with a problem. They rather base their solutions on their feel for the car, which is built up in years of experience. This experience involves a background of cultural knowledge, learnt practices and habits, and is of major importance for the pragmatics of material interaction (Dant 2008). A straightforward example of this is when confronted with a bolt. The apprentice has to be familiar with the principle of screw thread, and he has to know which tool to handle it with (usually a spanner). The same goes for more complex car parts and is contextspecific. Parts used in a workshop specialised in Japanese cars, for example, might differ from the parts used in, say, one specialised in German cars. Obtaining this knowledge of the materiality in which the apprentice is situated, is a crucial part of the first phase of the apprenticeship. Whatever is unknown to the apprentice might be overcome by the communication between him and the object. Material, size, and specifics in shape might give him some clue about the purpose to which the part or tool was designed. This reading, through the senses, of objects by human beings is crucial to interaction and is situated. The interpretation of the *language* used by objects is dependent on the context it is used in. The nature of the learning in apprenticeships connects very well with these described characteristics of auto repair. Obtaining the tacit knowledge might best be accomplished by actually observing and participating hands-on in the work.

Changing materiality

The apprentice in the Suame Magazine is working his way through a complex social and material setting. Clearly, material objects in various shapes and forms are an integral part of the learning process of the apprentice. As a newcomer, the apprentice learns a significant part of the anatomy of vehicles from the cars that are parked all around the Magazine in different shapes. Car parts come back in different functions in the decor of the Magazine, while visual and bodily contact with tools and parts evoke a feel for fixing cars within the apprentice.

The continued engagement with the materiality of the workshop at all levels,

however, is gradually changing. Electronic equipment is taking a more prominent role in modern cars, resulting in a demand for skills that poses a challenge to the current generation of mechanics in the Magazine. To keep up with the material constellation of recent car models, stuffed with computer-guided sensors and other electronic devices, workshop holders as well as apprentices will have to adjust their skills in order to survive. The Suame Magazine Industrial Development Organization (SMIDO) is one of the few organisations anticipating these changes by establishing an ICT learning centre. Interestingly, the increasing importance of computer-based electronic equipment has given a new boost to studies that look at the interfaces between designers, computer hardware, software and users (Suchman 1987). It seems that in a *high-material* environment like the Suame Magazine, the importance of material interaction strikes as crucial as much as the lack of material interaction forms a challenge in the development of simulation software. Clearly, the role of materiality is an important ingredient in on-the-job learning and therefore a key ingredient for studies on apprenticeship systems.

Another example is the already introduced SMIDO itself, founded in 2006 by people with little hands-on experience. While acting on behalf of the mechanics, the organisation is partly headed by academically trained people. With a different training and different social networks, they have found their way to foreign donor agencies, like the Business Sector Advocacy Challenge (BUSAC). A shift in the necessary competencies in and around the Magazine, like the one just described, leads to a shift in what is valued in the training of future participants in the Magazine. Clearly this does not mean that all apprentices have to be trained academically nowadays in order to survive, but the share of apprentices that takes place in the zonal boards of the associations will need to know how to go about processes like the interaction with donor agencies. Anticipating the changing material realities at the workshop level requires investments at the higher levels. The mentioned ICT-related knowledge, congestion of the area, unreliable power supply and poor road infrastructure are some of the ten most urgent problems identified by SMIDO (Azongo 2007).

The strong emphasis on materiality in the Suame Magazine is not perceived by everybody as solely a good thing. Some masters who were trained in professional schools and teachers in technical institutes fear that the lack of theoretical training among the Magazine apprentices hampers their education and future work. Their education is strongly dependent on the work that is offered to them, and they do not develop any general scientific knowledge, in physics or chemistry for instance, that could serve as background knowledge to their mechanics work. One interesting and very concrete example of this development is that the apprentices of the Suame Magazine develop their own vocabulary when it comes to car parts, which differs from the original, correct names. The propeller shaft, for example, is often called *long shaft* in the Magazine.

Conclusion

We have argued that materiality shapes the learning that takes place within the context of the apprenticeship system in the Suame Magazine in several ways. This starts with the lay-out of the industrial complex itself. Almost all the work takes place outside the workshops, leading to a very open learning environment. Walking around the Magazine is impressive due to the overwhelming presence of car parts in the various stores. We have also shown that the status of apprentices correlates with the mastery of certain parts of the car. The closer to the engine, the higher the status. One point of concern is that the skill demand of the work in the Magazine is changing. With information and communication technology claiming a more prominent role in vehicles, the Magazine mechanics will have to find a way of dealing with these new material conditions as they have done in the past when other innovations affected the car industry.

The importance of materiality in apprenticeship learning seems to be a phenomenon not restricted to an African situation like the Suame Magazine. The quoted works of Lave and Dant both refer to the role of materiality in learning based on case material collected in the US and the UK. What we have hopefully shown is that the

insights they provide is helpful not only to understand the presented case of the Suame Magazine but to underline the importance of material conditions and material interaction for apprenticeship learning. The intensity in which the mind and body of the apprentice interact with the material environment in an apprenticeship learning environment might even be the main feature of what makes apprenticeship learning distinct from learning in a classroom setting. For both researchers and policy makers, striking a balance between the material-extensive situation of the classroom and the material-intensive situation of a work environment forms the major challenge in creating effective learning trajectories.

Authors' note

Unfortunately, pictures could not be included in this article for reasons related to layout and printing. Nevertheless, we believe the moving images or stills perfectly show the material and non-verbal nature of the work in the Suame Magazine. For those readers who are interested in seeing these images, please contact the corresponding author (see email address on the first page).

References

- Akrich, M. 1992. The de-scription of technical objects. In: *Shaping technology – building society: Studies in sociotechnical change*, ed. W. Bijker and J. Law, 205–24. Cambridge: MIT.
- Arthur, P.K. 2001. Promoting small-scale industries in Ghana: Development institutions, culture and policies. UMI Dissertation Services, Bell & Howell, USA.
- Azongo, N.-A. 2007. SMIDO industrial policy blueprint. (No publisher.)
- Bas, D. 1989. On-the-job training in Africa. *International Labour Review* 128, no. 4: 485–96.
- Breyer, J. 2007. *Financial arrangements in traditional apprenticeships: Determinants and effects. Findings from Ghana*. Geneva: ILO.
- Brockmann, M. 2010. Identity and apprenticeship: The case of English motor vehicle maintenance apprentices. *Journal of Vocational Education and Training* 62, no. 1: 63–73.
- Butler, J., and R. Brooker. 1998. The learning context within technical and further education colleges as perceived by apprentices and their workplace supervisors. *Journal of Vocational Education and Training* 50, no. 1: 79–96.
- Dant, T. 2008. The pragmatics of material interaction. *Journal of Consumer Culture* 8, no. 1: 11–33.
- Fuller, A., and L. Unwin. Reconceptualising apprenticeship: Exploring the relationship between work and learning. *Journal of Vocational Training and Education* 50, no. 2: 153–73.
- Guile, D., and M. Young. 1998. Apprenticeship as a conceptual basis for a social theory of learning. *Journal of Vocational Education and Training* 50, no. 2: 173–92.
- Hart, K. 1973. Informal income opportunities and urban employment in Ghana. *Journal of Modern African Studies* 1, no. 1: 61–89.
- Lave, J. 1996. The values of qualification. In *Power, action and belief*, ed. J. Law. London: Routledge.
- Lave, J., and E. Wenger. 1991. *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.
- Machin, S., and A. Vignoles. 2006. *Education policy in the UK*. London: London School of Economics.
- McCormick, D. 1998. Enterprise clusters in Africa: On the way to industrialisation? IDS discussion paper, 366.
- McLaughlin, S.D. 1979. The wayside mechanic: An analysis of skill acquisition in Ghana. PhD diss., University of Massachusetts.
- Mellström, U. 2002. Patriarchal machines and masculine embodiment. *Science, Technology and Human Values* 27, no. 4: 460–78.
- Palmer, R. 2007. Skills development, the enabling environment and informal micro-enterprise in Ghana. PhD diss., University of Edinburgh.
- Porcello, T. 2004. Speaking of sound: Language and the professionalization of sound-recording engineers. *Social Studies of Science* 34, no. 5: 733–58.
- Powell, J. 1995. *The survival of the fitter*. London: Intermediate Technology Publications.
- Scribner, S., and M. Cole. 1973. Cognitive consequences of formal and informal education. *Science* 182, no. 4112: 553–9.

- Sennett, R. 2008. *The craftsman*. New Haven, CT: Yale University Press.
- Steedman, H. 2001. Five years of the modern apprenticeship initiative: An assessment against continental European models. *National Institute Economic Review* 178: 75–87.
- Suchman, L. 1987. *Plans and situated actions: The problem of human-machine communication*. Cambridge: Cambridge University Press.
- Verrips, J., and B. Meyer. 2001. Kwaku's car: The struggles and stories of a Ghanaian longdistance taxi-driver. In *Car cultures*, ed. D. Miller, 153–84. Oxford: Berg Publishers.
- Wallaert-Petre, H. 2001. Learning how to make the right pots: Apprenticeship strategies and material culture, a case study in handmade pottery from Cameroon. *Journal of Anthropological Research* 57, no. 4: 471–93.
- Wals, A.E.J. 2007. *Social learning towards a sustainable world*. Wageningen: Wageningen Academic.