

Skill and Deskillling in Two Automotive Assembly Plants in South Africa

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Abstract: This article presents research on skills development and workplace change complexities within two automotive assembly plants in Pretoria, South Africa. Auto assembly companies are also termed Original Equipment Manufacturers (OEMs). Since 1995, South African OEMs have become fully integrated into the global networks of their foreign parent companies. As South Africa's leading manufacturing sector, the automotive industry's increasing importance is reflected in its exports, investments, and contribution to the country's gross domestic product. The two companies are global multinationals situated in one of South Africa's most globally integrated sectors that have undergone significant mechanization and automation since the 1990s. Therefore, these companies present a relevant site for studying changes in the labor process and the tendencies of deskillling in these workplace environments.

The research is based on a qualitative research design that used semi-structured interviews with workers, supervisors, and managers across two plants that assemble motor vehicles in South Africa. The objective of the research was to understand the nature of changes to workplace production methods that influence the character of skills amongst the workforce. This paper studies workers' experiences on how changes in work processes have impacted their work skills and contributed to the processes of deskillling. Present studies of skills in South Africa have prioritized large-scale labor market aggregate data analysis or reforms in education and training policies of the state. This paper brings a perspective on the labor process changes that are informed by concrete analysis of the production process and how technological changes shape the character of skills formation within automotive assembly plants. The value of such an approach is that it brings to the discussion of technology and workplace change a more specific set of experiences that transcends the often speculative and mythical discussion about the impact of technology on work. This article highlights the importance of understanding workers' voices, shift supervisors, and managers on the contested nature of skills development within capitalist enterprises. The findings illustrate the contradictory nature of technological change and skills development. This is shown by discussing the following themes that emerged from the findings: 1) worker responses to the introduction of robots in the workplace environment, 2) the deskillling challenge on the two plants, and 3) grappling with the turnover times of capitalist production. I conclude the paper by revisiting the key findings of the research and showing the implications for future studies of deskillling in contemporary capitalist enterprises. The significance of these findings ultimately points to the importance of locating labor processes and deskillling in the context of the political economy of the capitalist mode of production and how it is reshaping the content of work in modern automotive assembly plants.

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This article emerges from questions surrounding the skills implications of workplace changes within modern capitalist production enterprises. The research is situated within the broad field of sociology of work and the study of processes of skills and deskilling (Previtali and Fagiani 2015; Chen and Sonn 2019; Leslie and Rantisi 2019; Kenny and Webster 2021). In this study, two auto assembly companies in the Pretoria auto cluster were visited, and interviews were conducted with workers and management regarding production skills. The two companies are global multinationals situated in one of South Africa's most globally integrated sectors that have undergone significant mechanization and automation since the 1990s. They were selected based on the leading role they have played in terms of the introduction of robotics since the 1980s, various forms of technology, and the intensification of work through methodologies such as the multi-modal production of vehicles. As South Africa's leading manufacturing sector, the automotive industry's increasing importance is reflected in its exports and investments and contributes to the country's gross domestic product.

This research brings a critical dimension to the field of skills research as it seeks to grapple with the intricacies of workplace change in production and its impact on skills. The micro-level dimension of the

research helps to unravel an aspect of skills research that tends to be dominated by myths and speculation. Following Sawchuk (2006), skill in this paper is understood to have three dimensions: i) includes internalized capacities resident in the individual worker; ii) includes job design, divisions of labor, technology, and control; and iii) is socially constructed. The article covers the following issues: contextualizes the skills debate in South Africa, technology, and deskilling, outlines the methodology, and discusses findings related to worker responses to the introduction of robots, a depiction of the skills and deskilling challenge in the two automotive assembly plants, and grappling with the turnover times of capitalist production. The discussion and conclusion section brings the article together by analyzing key themes that have emerged in the research and the conceptualization of the study.

Contextualizing the Skills Debate in South Africa

In South Africa, at the core of the skills question under apartheid was the migrant labor system. The migrant labor system kept Africans subservient to a white economy to which they had to provide services and cheap labor. Apartheid ensured the protection of Whites in the labor market, segregated education, separated communities, and established

a Bantustan (homeland) system for blacks in rural areas. These enforced divisions and other measures underpinned the notion of skill under apartheid. As Kenny and Webster (2021:3) have argued, initially, the concept of colonial or racial despotism emerged as a way of capturing the notion that in apartheid South Africa, work was characterized by coercion rather than consent and by the domination of one racial group by another. Apartheid created a labor market hierarchy through the migrant labor system and Bantu education, which deliberately created a layer of black workers for specific purposes of use by capital. This labor market structure has left a legacy that resonates up till the current period when the racialized divisions of labor are still visible in the economy. Black African and Colored¹ workers are largely in lower-level occupations while White and Indian workers tend to occupy professional levels or higher-level occupations (Ngcwangu 2016:287).

The period of the 1990s saw intensive work within the Congress of South African Trade Unions (COSATU) around building research capacity and con-

¹ In South Africa, the population of Colored people refers to a mixed-race group; it is a category that is strongly contested since it has its origins in the apartheid classification system, which created “four nations” in South Africa: Black African, Colored, White, and Indian. This is unlike in many Northern societies where colored means Black or African. This classification has been rejected on grounds of the Black Consciousness thoughts of the late Stephen Bantu Biko, who articulated a view that we are all one race and that subscribing to the notion of a colored grouping within the Black population merely affirms the discriminatory practices of the past. On the other hand, the term “Black African” is used within nationalist-orientated political approaches such as those of the ruling African National Congress (ANC), which still uses the notion of a “National Question” in its analysis of South Africa’s social formation, that national question speaks of Blacks in general and Africans in particular. The result of this contestation is that many from the colored community reject the generally used ascriptive category of being called Colored because of its oppressive historical origins. While others use that identification despite the past discrimination, it is also still used in official statistical data and general parlance in South Africa.

tribution to economic policy debates for a democratic South Africa. In trade unions such as the National Union of Metalworkers of South Africa (NUMSA), there was a growing realization that skills training would provide a better basis for their members to demand higher wages considering the increase in skilled foreign workers being imported into the country at a higher rate of pay during the early 1990s. As Forrest (2011:217) states: “There was also a realization in Numsa that its semi-skilled and unskilled membership base was becoming disposable. The acquisition of skills would bring higher pay and give the retrenched a better chance of finding work.” This shows that skill is not a mere technical issue of application of acquired knowledge to types of work—it is informed of the dominant economic forces at a given time. The democratic government established in 1994 brought in new legislation, such as the Skills Development Act of 1998 and the Skills Levies Act of 1999, to regulate the skills system in the country and bring in a new skills dispensation and institutional apparatus to regulate funding, accreditation, and delivery of skills development.

Technology and Deskilling

Scholars have contested the nature of technology’s impact influenced by their theoretical outlooks on understanding the structure of global capitalism across various industries (Chen and Sonn 2019; Leslie and Rantisi 2019; Machacek and Hess 2019; Richardson and Bissell 2019). According to Aneesh (2001), the impact of technology on work is variable, lowering skills requirements in one respect while upgrading others; these are simultaneous processes occurring in workplaces under capitalism. While Thompson and Smith (2009) argue that the supposed need for skills in the new economy and paradigm shifts in production and markets were

seen to have positive implications for workers in the labor process. Team working in production implied a broadening of skills and devolution of job discretion from management to workers; contested mass markets required product differentiation and accompanying upskilling of workers to match more bespoke product markets; and new economic activity, especially ICTs and creative industries, increased demand for flexible and skilled workers, not detailed and skill-diminished ones (Thompson and Smith 2009:255).

The literature on technology and skills emphasizes both the negative and positive consequences of new technology (Brynjolfsson and McAfee 2014; Spencer 2016). The argument over whether the new technology will create more jobs or result in higher levels of unemployment is quite tenuous in the academic literature. Spencer (2016), for example, argues that outcomes of digital technologies for workers are often negative. The perpetuation of low-paid and low-skilled work can go together with the advance of digital technologies. Inequalities of income, gender, and status can also be reproduced, despite and potentially, because of digital technologies advancing. The regressive implications and impacts of digital technologies, in essence, stem from the class nature of the ownership and the drive for surplus value—they are necessary features of the progress of digital technologies under capitalism (Spencer 2016). This is related strongly to my findings in the sense that the insertion of technological changes in the workplace is almost always tied to efficiency improvements, cost reduction, and quality checks, which are essential to profit maximization by companies. This brings into focus how class relations are reproduced under capitalism whereby the system requires new technology to fragment and cheapen the cost of labor, which ultimately results in deskilling.

Brynjolfsson and McAfee (2014) acknowledge the negative and positive effects of new technologies on societies while also encouraging policymakers to harness digital technologies to create a better future for work and human society. In an optimistic tone, Brynjolfsson and McAfee (2014) state that what they see as a rapid recent acceleration in digital improvement is robotics—building machines that can navigate through and interact with the physical world of factories and warehouses, battlefields, and offices. In this sense, for them, change will be very gradual, than sudden. Critical to understand is that these authors are focusing on the power of the computer instrumentally, but are not considering the wider political context in which such technologies develop and the implications these advancements can have for ordinary working people.

It is against this backdrop that deskilling can be understood on a conceptually different plane—as a process revolving around autonomy/control and not skills per se. It is a concept that theorizes formal disempowerment, appropriation, and, in a wider sense, cultural disinheritance, as old skills forms are displaced and the new ones that emerge are both limited and limiting in terms of anything but exchange value generation (Sawchuk 2006:611). In this sense, deskilling occurs in a context where workers are progressively reduced to performing simplified and routinized tasks. In this new context, a deskilled worker can learn in a few weeks to produce something that previously required years for a skilled worker to learn (Previtali and Fagiani 2015:80). My discussion on how workers in the automotive assembly industry respond and experience robotics technology in the workplace shows a mixed reaction to the enabling and the disabling features of the robotics that are being used on their factory floors. The findings section shows how the tendency

of robots contributing to job losses is often best observable in the long term, spanning decades rather than short-term cycles.

With lean production and flexible specialization, the content of work performed by employees is affected. Developing countries are under constant pressure to keep up with global trends of new technology and to show their international counterparts that they are developing the necessary skills to partake in contemporary globalization processes. As one research report of a South African state entity, the Manufacturing, Engineering, and Related Services Sector Education and Training Authority (merSETA²) states:

Global competitiveness among SA [South Africa] manufacturers is hindered by their inability to keep up with global advances in technology such as computer-aided design (CAD), computer-aided modeling (CAM), and Computer Numerical Control (CNC). The failure to keep up with the last of these has impacted dramatically on the productivity and quality of sheet metal fabricators. Combined with policies that seek to promote the use of local content, this has resulted in local OEMs persuading international first-tier suppliers to set up Greenfields operations in SA. [The] industry has expressed concerns that while it is easy to import technology in this way, SA needs to have the skills base to maintain it if it is to be used productively and efficiently. [merSETA 2013:48]

Mashilo (2010:27) states, “Our modern-day automotive industry reflects the state-of-the-art of automa-

tion. This applies both to automotive assembly plants and to components manufacturing plants, with exception of some labor-intensive methods in the latter. In addition, the production process is continuous not just within plants but between assembly plants and components manufacturing plants which supply the means of production to assembly plants.” With lean production emphasizing teamwork and “multi-skilling,” the content of skill is also aggregated within a team.

Skills development directed at workers, therefore, must take into account the power imbalance between workers and employers. In the twentieth century and the late nineteenth century, skilled work implied a certain degree of autonomy and control over work. This control meant that skilled artisans, for example, also had control over the tools and basic machinery they used for work. Thompson and Smith (2009:258) have pointed out that the limitations of Braverman’s craft-orientated understandings of skill remind us that we need to maintain a focus on how the major economic actors seek to transform and utilize labor power rather than read skills through a particular time and template. The advent of technology and the separation of the worker from the product through the distribution and sales system meant that the power of the skilled worker had been reshaped.

As stated by Chen and Sonn (2019:255), deskilling is highly affected by external conditions, especially the quality and quantity of demand. This is the context in which robotics are introduced in the production process to improve quality, increase the speed of production, and minimize ergonomic challenges in the production process. While the question of deskilling is well covered in the theoretical literature, many scholars generally do not provide sufficient qualitative research to demonstrate concrete

² The Manufacturing, Engineering, and Related Services Sector Education and Training Authority (merSETA) is one of 21 Sector Education and Training Authorities (SETAs) established to promote skills development in terms of the Skills Development Act of 1998 (as amended). The 21 SETAs broadly reflect different sectors of the South African economy. MerSETA encompasses manufacturing, engineering, and related services.

evidence about changes in the workplace that contribute to deskilling. I drew on the tensions and contestations in the literature to look at how empirical evidence drawn from qualitative research in production factories can contribute to a more concrete understanding of how technology and deskilling manifest in the workplace environment.

Methodological Outline

The research for this study combined semi-structured interviews, document analysis, and observations in the two auto assembly plants. The research process itself lasted eighteen months, not consecutive but done in different phases due to the logistical challenges of doing fieldwork. The two companies have been anonymized as per the ethical requirements of the research and the request by the participants to be anonymized.

“Company A”

This company is a subsidiary of a global manufacturing company that started in Japan. The company was the leading motor vehicle seller in South Africa during the 1980s. The company’s production consisted of seven platforms and, up to 1995, had manufactured two passenger car models. In 2008, the company only had three platforms. R1 billion (approx. 68382528.00 EUR) was invested to build the company’s right-hand drive versions. The manufacturing methodology driving the company’s increased productivity is encapsulated in its vision of being quality-driven and waste-free.

“Company B”

This company originated in the United States of America and started its operations in South Africa

during the early twentieth century. The company is considered the most technologically advanced car manufacturer in the country. It was the first to introduce robots in 1987 in its body shops, followed by its paint shops. Its complex, multi-model production outline performs on a highly diversified output, having a product range that consists of eleven models with more than one hundred and thirty variants.

Accessing the field involved a departure from conventional methods of calling up or emailing a potential interviewee. Like Cruz and Monteiro (2017:124), I realized the importance and benefits of privileged contacts, which facilitated a significant number of other interviews by mobilizing their network of interpersonal relationships. At times, previous contacts were used to secure appointments with the targeted interviewees. ‘Textbook style methodology’ tends to emphasize several rules, regulations, fieldwork protocols, and a structured way of doing qualitative fieldwork. Interestingly, in some instances, non-conventional (which are ethical) ways of gathering data and accessing the field operated as effectively as conventional prescriptions. “Without successfully negotiating access, research comes to a screeching halt. As well, access is not simply a one-shot deal that is negotiated once and for all; rather, it is negotiated and renegotiated throughout the research and is thus an ongoing process” (Lofland et al. 2006:21). For instance, the requirements of calling up participants, setting up appointments, and similar logistical approaches were not always effective for me in this study, the research required constant renegotiation of access. Through personal contacts and networks within the trade union, participants were approached directly and interviewed anywhere at the plants, during training sessions, in the staff office, between a march/protest, and at the soccer grounds where the workers play games on Friday afternoons.

Access to the participants took three forms. Firstly, I spoke to supervisors and shop stewards who were willing to participate in the research and initially had key informant interviews with them and informal discussions about my research. Secondly, those who were interviewed suggested that I try to cover as much of the plants as possible to gain a more holistic picture of the production processes and skills training. Thirdly, I conducted interviews with workers I could speak to during their breaks and at the Friday afternoon soccer sessions and social events at one of the plants. On the other plant, I was able to interview workers during the downtime training sessions held off-site and between the strikes that took place at the plant.

The world of industrial production and the automotive sector was not entirely new to me as I had previously worked for two years (2001-2002) as a production and export planner at Leoni Wiring Systems in East London, a company that produces motor car harnesses (electronic wiring), supplying them to various automotive assemblers in South Africa and internationally. The experience gained working at Leoni Wiring placed me in good stead when encountering the production jargon and the physical structure of the two plants. Basic knowledge of the production efficiency calculations, the feasibility planning, and the language of 'line re-balancing' allowed for an easy flow of conversation and interaction with the various workers and managers within the two production plants. However, the rapid changes in technology and the might of the *logistics revolution*³ struck me as major changes

³ By this I mean the extensive network and power of logistics over the production process. Logistics handles the materials, delivery, and supplies to and from the plants. Over recent years, the phenomenon of logistics and supply value chains has been seen as central to the changing modes of capitalist accumulation, as transport networks are also affected by

since I had last been in a production plant around 2002.

In the context of this research, I was both an 'insider' and an 'outsider' given that, for instance, amongst the workers in the plants, I was unknown to them prior to engaging in the research. So, the language and terminologies they used in responding to questions were framed according to what they thought would be a level required for research purposes. In other words, it tended to be formalistic as some of the concepts are technical and require a deep understanding of their work to appreciate the jargon linked to them. As an example, the language of robotics and production scheduling assumes one has experience in production about how the content of the work is done. 'Outsiderness' also has its disadvantages because to grasp the broader meaning, one needs a basic knowledge of the various technologies in production. However, at the same time, the 'insiders' (the workers) seemed to appreciate the critical way in which I questioned the outcomes or content of the production processes in their workplaces and the related restructuring of production.

I visited these two plants about two times each to conduct visits and to gain a sense of how production is working and to speak with some of the workers on the lines to ascertain their views on the production process. During these visits, I conducted observations based on looking at the organization of the production processes and the warehousing system; how operators insert parts into the vehicles on a moving assembly line, the paint shop, as well as the body shop, which are crucial to

the wide logistics systems that form the backbone of modern economies. See: Bonacich and Wilson (2008) for further elaboration on the concept of the *logistics revolution*.

the quality of the final product. This is tied closely to the rigid ways in which time is regulated in the plants. Whether it is the timing of the breaks, the timing of production output in line with efficiency, which translates into 'unit production' per segment of the plant, or whether it has to do with the 'best time' to make for interviews is all largely centered on time. The availability of workers who work on the production line is regulated by these structures of time. Shift workers at both plants start work at 06h00 or so, have the first break at 09h00, and finally knock off shift at around 14h00.

My first impression of the plants is that they are highly securitized with tall fences, electronic detection devices, and a few other checkpoints. The plants are clearly on high-speed production schedules with various signboards showing production cycles and daily targets of the plant. Entering the plant also has a literally cold atmosphere with workers spread in line with their operational duties within the various segments, which are demarcated. The movement of hysters and shifting of production components in and out of the plant was coupled with loud noise and screeching of these machines. I have used the richness of these observations to inform the analysis of the data, which I cover in the sections below.

The conventional setup of appointments, which is familiar amongst white-collar workers, had to change for the interviews with the training manager and the training supervisor, as they are also aligned with shift times that link to the production schedules of the plant. The visits did not last long as there are rules on how people access the plants and the safety requirements for visitors. I, therefore, had to access informal groups of workers, which gather on Fridays and during a more social atmosphere, to

do further interviews and extend areas of research I may have missed through formal interviews. I was able to keep descriptive notes as I was taken for the tours by the training facilitators.

Interviews with the workers at both plants were aimed at soliciting the workers' experiences related to skills development / training at a practical level at the point of production. What stands out as a significant feature is that production philosophies are similar across the two companies and vary mainly on the branding and the type of product manufactured. The workers interviewed seemed to have a strong sense of a need for improved working conditions in their respective plants, as well as greater opportunities to empower themselves educationally for life beyond the plant. Workers do use the space created by researchers to express their general frustrations with some aspects of work as they view it as an opportunity to describe such frustrations to an outsider.

The approach to the analysis of the data was based on thematic analysis. This is due to the research questions that are open-ended and are meant to elicit a broad range of responses. Unlike a survey method, the semi-structured interviews generated data that are more suitable to analyze thematically. Just as Silva, Gillmann, and Tate (2018) have stated, I was less concerned with finding a representative sample; my idea was to get data through open-ended questions, which would show meanings, attitudes, and subjective factors that are critical in producing findings that are relevant to the objectives of the research. The thematic analysis allows for themes, patterns, convergences, paradoxes, and contrasts to be identified. In the research, six steps were followed in the thematic analysis, as shown in Table 1 below.

Table 1. Six steps in the thematic analysis

Step No.	Description of theme	Activities
Step 1	Familiarity with data	18 interviews were transcribed, and the author revisited them before writing them out . The audio tape was double-checked for accuracy.
Step 2	Generate initial codes	Coding was done manually and considered the context of the interviews. Returning to the literature was critical in informing the nature of the codes developed.
Step 3	Discovering themes/ searching for themes	Initially, a mind map of the codes was developed, which was iterative. This informed the development of sub-themes in the write-up of the research.
Step 4	Reviewing themes	The focus was on internal coherence within the themes; these are discussed in the findings section.
Step 5	Definition and naming of themes	The naming of themes was based on narrowing the focus of a theme. The goal was to capture the essence of a theme.
Step 6	Writing the analysis	The final write-up followed the themes emerging from the analysis.

Source: Adapted from Ruggunan (2013).

Interviews were transcribed and a three-step process of coding was followed—*open*, *axial*, and *selective coding*. Open coding involves the researcher assigning initial codes in a first attempt to condense the data into categories. Corbin and Strauss (2012) maintain that open coding involves data analysis, which forms categories of information and a grouping of the statements into broad ideas. Axial coding is a second pass through the data whereby the focus is on the initial codes rather than the data. Selective coding involves scanning all the data and previous codes; major themes are then generated with this phase of the coding process (Neuman 2006). The idea of the coding strategy was to reduce the large data into a manageable size, which follows the themes generated through the interviews.

Corbin and Strauss (2012:66) argue that coding is more than just paraphrasing. It is more than just noting concepts in the margins of the field notes or making a list of codes as in a computer program. It involves interacting with data (analysis) using techniques such as asking questions about the data, making comparisons between data, and so on, and in doing so, deriving concepts to stand for those data, then developing those concepts in terms of their properties and dimensions.

Questions of Race, Class, and Gender in the Field

South Africa comes from a history of colonial and apartheid oppression in which racial oppression of the Black majority by both White colonial settlers

and successive governments of National Party administrations of the apartheid system was crucial in the marginalization of Black people from the economic mainstream of the country. Apartheid and colonization, however, did not only assume a racial form but also assumed a gender and class form. Black women suffered what is commonly referred to as “triple oppression,” as they have been oppressed as a race, a class, and a gender. Questions of race, gender, and class can never be overlooked by a social science researcher in South Africa; while doing fieldwork, these issues manifested through ongoing engagement with different interviewees.

Lofland and colleagues (2006) maintain that virtually all social orders place emphasis, although in varying degrees, on ascriptive categories such as gender, age, race, or ethnicity as important criteria for differentiating among people. Sociologists doing research in South Africa have to be aware of this context regardless of which research is being conducted. Of the 18 respondents, three were females, and 15 were males; only one of the females interviewed was in a management or supervisory position, while of the males, five were in supervisory or management positions and others were general workers in the production operations.

Table 2. Information about the sample

Gender	Race	Position held	Years of employment	Total
Female	Black/African	Supervisor	12	1
Female	Black/African	Worker-operator	8	1
Female	Black/African	Worker-operator	5	1
Male	White	Management/Supervisor	14	1
Male	White	Management/Supervisor	6	1
Male	White	Management/Supervisor	25	1
Male	Black/African	Management/Supervisor	11	1
Male	Black/African	Management/Supervisor	7	1
Male	Black/African	Worker-operator	11	1
Male	Black/African	Worker-operator	30	1
Male	Black/African	Worker-operator	6	1
Male	Black/African	Worker-operator	18	1
Male	Black/African	Worker-operator	12	1
Male	Black/African	Worker-operator	9	1
Male	Black/African	Worker-operator	8	1
Male	Black/African	Worker-operator	16	1
Male	Black/African	Worker-operator	5	1
Male	Black/African	Worker-operator	9	1
Total				18

Source: Self-elaboration.

The 'color' of research, publications, and intellectual voice remains an issue even in the post-apartheid context in South Africa. The subjugation of Blacks and the provision of poor education were meant to reduce Blacks to positions of factory laborers and administrators of apartheid's Bantustans (Hlatshwayo 2013:165). The result is that research output is influenced by dynamics of racial inequalities and 'fields' that tend to focus on Blacks as objects of research. The result is that researchers are constantly reflecting on race within the context of sociological research. As one leading critic stated:

The rubbishing of race has a long history in South African scholarship. The academy refuses to engage race as a legitimate scholarly pursuit. New field studies lack sufficient critical theoretical grounding as they continue the patronizing focus on blacks as objects of study. Sociology seems to suffer from an acute case of identity crisis. [Mngxitama 2009]

These assertions have raised extensive debates in South African sociology, particularly as they relate to the categories of "race" and "class" in the field. The gender dynamic in South Africa manifests quite significantly within sites of decision-making in which males have historically dominated; the gender make up of decision-making and policy influence has a bearing on the sensitivities towards gender. Feminism as a philosophy is not necessarily confined to biological make up; it is a question of engaging with a masculine power structure, which expresses itself in broader societal relations and the capitalist economic order. Tshoaedi (2008:47) further argues:

Women, particularly African working-class women, are often excluded from this process either as knowledge producers or full participants in the process of

knowledge production. Research and knowledge production processes as arenas that are still exclusively dominated by the privileged few have implications for the research frameworks that are often followed in the process of gathering data. The binary oppositions of dominant and powerful versus marginal and weak, or educated and articulate versus less educated and inarticulate influence such frameworks. Approaching research from this standpoint already assigns research informants a less important role in the research process. It also assigns value to the different social worlds of the researcher and the research informants.

"Race" mattered together with language in my accessing the workers. Fluency in isiXhosa and conversational understanding of Setswana (which are amongst African indigenous languages within South Africa) facilitated easier access to the workers. Language is critical in providing access to the proletarian classes. It bridges the alienating effects of English and creates a space for first-language speakers to truly 'speak their minds.' It is one thing to enter a plant and be given permission, but completely another matter to build rapport with the interviewees. Being a Black person among these workers made navigating the research process far easier. The research of this study is cognizant and took into account the race, gender, and class questions as a triumvirate of issues that define the social formation of present-day South Africa. For example, my participants reflect the still existing racial inequalities in the country where Blacks are largely workers in elementary and less skilled occupations whereas, to a large extent, their White counterparts are in managerial and supervisory positions. It was against this background that the findings of the study emerged and the perspectives of workers on skills discerned.

Hearing Workers' Voices on Processes of Technology, Skills, and Deskilling in the Production Process

This section aims to understand the reflections of the workers to questions over skills development and work restructuring at their respective plants. The interview questions included: 1) Skills Development / Training is considered critical to the success of production in companies such as yours. How are you experiencing the various training programs offered by your company? 2) How have changes in production methods affected workplace training, in particular technical training? 3) What challenges/problems do you foresee due to workplace restructuring? 4) What role has technology played in affecting the skills training practices at your company? 5) How effective is the Training / Workplace forum in guiding workers' exposure to training opportunities? A critical issue in the writing out of the findings was to show anomalies or surprises that arose from the analysis. This involves going back to the literature and pointing out areas of convergence, divergence, and common patterns.

The idea is to acknowledge the 'voices' of the participants because the research process was not merely about communicating the authoritative knowledge of the researcher but involved learning from the interviewees. As Burawoy (2009) has stated, the key issue about qualitative research is the extension of theory by identifying anomalies and intellectual 'puzzles' that come from the findings and impact theory. There are three thematic areas that are discussed: 1) worker responses to the introduction of robots in the workplace environment; 2) the deskilling challenge on the two plants; and 3) grappling with the turnover times of capitalist production.

Theme 1: Worker Responses to the Introduction of Robots in the Workplace Environment

Within global production systems of companies, it appears that the usage of technology is uneven or mitigated by state policy intervention in certain countries. For instance, some workers believe that less technology has been introduced in their plant compared to other plants of their company in other parts of the world.

In our case, here, like our plants in South Africa, we don't have so many automated machines, we are more, like, depending on manual labor—on people, you see, there are only a few automations here. So, for a company whereby they are depending on automation, there will be an impact on quality, there is an impact on quality. The quality from automation compared to the human's quality, produced by quality, will differ obviously because that one of the automation—it will be always constant because that thing is programed and then it will always produce the same result; and then when coming to a human being, he is sometimes tired—get tired and sometimes having his own problems. [Participant 2, 2013, interview]

There are mixed reactions among workers over the extent of the usage of technology and automation in production within their respective companies. Some maintain that many operations still require human labor while robots are placed in strategic areas.

Speaking of our company specifically, it is not as automated. Almost 80% of our operations require human labor. Robots are in strategic areas, there are only 10 robots on the plant. In the body shop alone, there are 300 workers or so. The work is primarily done by human labor. [Participant 4, 2013, interview]

While this usage of robots in the body shop is consistent among the two plants, one employee worker defines the challenge as being about the consequences of the usage of technology for “re-balancing,” which is a reduction of staff and distribution of work through many workers. In this regard one operator in plant A stated:

Robots are only in the body shop; this is part of lean manufacturing resulting in rebalancing. This is basically a reduction of staff and distributing of a job or spreading of the work amongst workers. Some people only put the sides, the maintenance guy puts the panel, and the other repairs/programs the robots. [Participant 3, 2013, interview]

One worker in plant A argues that it makes no difference that other workers have degrees and diplomas because the machines are already programmed to do the work, and matric (grade 12) level education is sufficient (to do the work).

Someone with a matric should be able to survive in our workplace. It doesn't make much of a difference that some people have diplomas. The machine has been programmed to work in a certain way, in Japanese plants, the robot can fit the door and measure the gaps, which means fewer worries about quality. [Participant 14, 2013, interview]

So, when some workers view the introduction of robots with trepidation, they are responding to a concrete situation based on their visual observation of the overall reduction of staff in their environment. Specialist in-plant engineers or technicians come with specialist knowledge of technical subject areas on which they are re-trained to meet the specific requirements of the company.

Theme 2: The Deskilling Challenge in the Two Plants

Drawing from the findings of the research and the plant visits at the two auto plants, it appears that while Braverman's (1974) theory of deskilling remains perhaps the most seminal critique of the labor process under capitalism, there is a need to transcend this theory and enrich it with newer findings. My findings reflect that the phenomenon of deskilling is prevalent in both plants, which has an effect both internally in the plant and externally in society. The education system is, therefore, integrated into the debate of skill and deskilling in the sense that the knowledge content of all employees begins with education at both school and post-school institutions. Previtali and Fagiani (2015: 87) argue that when we analyze educated workers, we can argue that they are also subject to a process of proletarianization because their work, through the rationalization imposed by capital, is increasingly portrayed as manual rather than intellectual. Here, too, is a deskilling of labor and a flattening of wage levels, increasingly leading to the devaluation of work, both symbolically and materially.

Using Braverman's notions of conception and execution, I maintain that 'deskilling' occurs within the area of execution that is the internal plant level, while skill acquisition is largely external through education and the multinational production planning philosophies of large automotive companies. "Braverman's thesis on skill degradation through the continued separation between head and hand (conceptual and operational skills) misses new areas of accumulation that are constantly innovated within capitalism through its international expansion and technological dynamism. One key area

is the qualitative intensification of labor through more flexible and expanded use of worker capacities and tacit knowledge" (Thompson and Smith 2009:260). Braverman's thesis is useful, however, if we require modifications and augmentation of his theory to make better sense of the intersection between skill and production in the automotive assembly space.

Auto plants have a greater number of operator-level workers within the various segments of the plant, who are a combination of experienced, skilled, and so-called "unskilled" workers in relation to the work requirements of their plants. But, the deskilling that occurs intensifies due to the extensive introduction of technology, which is discussed in the section above on the impact of technological changes and work restructuring on skills development. Central to this technological intensification is the reduction in overall employment over time, which is a key feature of capitalism's production of a 'reserve army' of the unemployed.

To truly appreciate the complex nature of the skills issue, I argue that we should realize that, on the one hand, is a 'deskilling' component, the effects of which are felt on a large scale. Typically, operators in assembly lines remain largely involved in repetitive tasks and routine work. The education levels of these workers at both plants have improved dramatically since 1994 with the opening of a democratic education system in South Africa. On the other hand, there is a component of 'execution' in the sense that Braverman would describe it, which is the actual doing of the work where an assembly is critical.

This deskilling is occurring at a large scale because there is a greater concentration of workers at these

lower levels of automotive assembly. Drawing on the findings, deskilling occurs both internally within the plant, but also externally in society. Deskilling in society occurs as the effects of technological intensification increase almost concurrently with a rise in youth unemployment, as an example. The unemployed youth include qualified graduates who simply are not being absorbed in large enough numbers into the industry. Some including artisans have been used on the assembly lines, as one plant-level supervisor states:

Due to line rebalancing at many auto assembly plants, we are also seeing artisans having to work on the lines due to a lack of relevant work for them. This is the situation that is occurring frequently as companies face pressure to reduce costs and lay off staff. Artisans end up taking operator-level work to at least remain in employment rather than be retrenched. [Participant 17, 2013, interview]

Beyond these categories there exists a more skill-intensive and autonomous range of skill acquisition and application. This area is where higher-level University or University of Technology educated workers operate. These include engineers, procurement managers, cost accountants, and such who are brought into the entire process of planning for production. Their skills are often utilized to ensure that cost reduction is implemented through lean production, the introduction of new technology through innovation, and ultimately reduction in employment. The external dimension of the production planning regimes of multinational companies tends to be standardized across plants within a multinational system of a company. These production regimes impact directly on how skills are utilized and which technologies are introduced. Braverman would have described this

as the “conception” domain. In this way, when we discuss skills development in the economy, this approach can be useful in understanding where and how skills are inserted within the broader political economy of work.

Theme 3: Grappling with the Turnover Times of Capitalist Production

Interviews with the workers at both plants were aimed at soliciting the worker’s experiences related to skills development at a practical level at the point of production. Interviews concentrated on specific segments of the plant: body shop and paint shop & trim and body. What stands out as a significant feature is that production philosophies are similar across the two companies and vary mainly on the branding and the type of product manufactured. The workers interviewed seemed to have a strong sense of a need for improved working conditions in their respective plants, as well as greater opportunities to empower themselves educationally for life beyond the plant. Workers do use the space created by researchers as a form of expressing their general frustrations with some aspects of work as they view it as an opportunity to describe such frustrations to an outsider.

Paint Shop & Trim and Body

It has been stated above that speed is critical in the production process, wherein efficiencies and time-based production methods are central to the organization of work. In addition to this, robotics has become more widely used in the South African automotive assembly sector. Speed is so critical to a point that one worker says it takes three minutes and three seconds to complete a work cycle in the paint shop and trim and body segment, which in-

cludes fitting in seatbelts, brakes, and other final trimmings to a car.

Our cycle times are 3.3 compared to the 1.1 of our UK company’s takt time. [This] means that [it takes] 3 and half minutes to produce the car in the trim area. The complexity is that while trimming the customer is in mind because that’s what they feel. Importance A—tightness of brakes can cause an accident. Importance B—is the safety belt, for example, so that if A fails, the safety belt will kick in. Other issues like color are also important as per the standard it shouldn’t be “off-color;” only after training you can see and differentiate between these colors. [Participant 10, 2013, interview]

Considering the speed at which this production takes place, one would have to include skill and knowledge within the pace of production. With experience, workers also add their tacit knowledge to the production process. Skills are not acquired or applied in the abstract—they emerge concretely within this production arrangement. New employees are trained in the philosophy of *Genba Kanri* and respect for standards on the shop floor, which is key to cost savings strategies. There are now fewer workers in the paint shop at plant B, given the ongoing cost reductions.

There are manual application spray painters, which will only concentrate on the interiors of the car, and then the robotics will spray on the outside part of the car, and then the same in a top coat we have manual spray painters, which are the human being, they will concentrate on the interiors of the car because the robot cannot open the door and spray, so they will spray inside the car and then the robots will spray the outside of the car—the bigger part of the car—it will be the robots. [Participant 13, 2013, interview]

In this sense, we see the extent to which robots have taken over significant parts of the work of employees in the paint shop, as in the manual processes of painting the external parts of the shell of a car. The workers still do the manual painting internally, but for how long will this be maintained? Once the innovation systems can produce robots that can do internal painting, the possibilities are high for further reductions in staff due to technological changes.

Body Shop

This entire organization of the production process from body shop assembly to paint, trim, and final quality checks express the deepest fault lines of capitalist accumulation. Workers are being increasingly sidelined from their actual work because of technology and innovations. Through this process, we can see the bipolar dynamic of skills within the capitalist production system. Fewer workers at a higher level of skill, together with management, determine the templates on which production is structured; the rest of the workers, largely operators, simply follow these templates. To have a full discussion on skills we must account for this bipolar dynamic in skills.

The body shop is a segment in which the “shell” of a car is assembled. It has spot welders, operators, and panel beating. It is where a car “takes shape” and the metal sheet is formed into the design of the car to be finally assembled. Most of the work in this segment is simple repetitive work.

Body, well, everyone will argue that his area is the most important because that’s what I will also say because I am responsible for the body shop and stumping, where every sheet is flat, and then they press it into different sizes and shapes for the car, and then it comes to the body shop where we use spot-knives to

join all these metal systems. The shape—the car, so it works more like a stapler, you know, a stapler when you staple pages and all of those, so we staple metal sheets to form the shape of the body of the car. [Participant 10, 2013, interview]

The importance of technical subjects and mathematics is often stressed as critical to acquiring skills that are relevant in the workplace. However, some jobs do not always require these skills, even though they are within the technical production process. The work in the body shop varies between technical and operational work. Typical operator work requires a minimum of grade 10 and good English language skills. Where training is required, it is in areas such as panel beating. One team leader described the work operations in the body shop as follows:

Operations in the body shop vary. There are operators and technical people; there are spot welders who assemble the vehicle and join parts. The minimum requirement for a typical operator is standard 8 and good English. Math [is] not necessarily important. Build vehicles through spot welding, before painting and fitting the doors. Co2 welding in the plant is divided into grades, so other jobs require skills such as panel beating, which takes four weeks to train. [Participant 11, 2013, interview]

What this means is that in a critical section, such as the body shop, there are varied skills required for production. The fact that the training can be done within four weeks or so implies that the work may not be as complex and may be simpler than some may be assumed by surveying the plant from the outside.

The most dominant philosophy of overproduction is quality or Total Quality Management (TQM),

which ensures that all specifications are complied with by workers. Skills are 'governed' by these production systems and philosophies, which influence how skills development occurs across the different segments of production. What we see from the body shop interview feedback is that the materials being used are changing and that workers, for instance in welding, embark on short-term, four-week-long courses to close the gap. In other words, they are acquiring skills on the job. The significance of these findings is that we learn about key tendencies in the internal logic of capitalist accumulation and how skill is simultaneously central to the production process, but, in other ways, skill is undermined by modern technological innovations.

Qualitative Analysis of the Interactions between the Participants

The experiences of workers with work restructuring and its implications for skill are not purely technical but also involve social processes that reflect interactions between people and the dilemmas that arise due to their location within a capitalist production enterprise. As Barchiesie (1998:107) argues, restructuring is not a neutral concept belonging to the field of managerial prerogatives. It is rather inseparable from the social construction of meanings that workers attach to industrial change and that they utilize to articulate responses along a continuum between acceptance and resistance that ultimately influence the direction of restructuring itself.

Based on the research I conducted on the two plants, I have identified two key thematic areas that are critical for qualitative analysis of skill and deskilling within modern production plants: (1) relationships between people and (2) interactions between workers and dilemmas that arise. On *relationships between*

people, I found that technologies bring new types of relations between workers familiar with technology and those with less knowledge of technology. This was critical given that the two plants had different orientations to technology and automation; company A was highly automated with high levels of technology utilized in production resulting in large-scale restructuring, while company B was still largely labor-intensive and had less automation in its operations.

What this implied was that at company A, younger workers who are technologically savvy tend to appear as being fast-tracked and given better remuneration packages compared to their older co-workers who have a lot of experience but not as much general technological exposure. This reshapes the terms of the relationships between the workers at both plants as the quest for technological upgrading has a knock-on effect on questions of grading, pay scale, and wages. Whilst this is negotiated by unions at the level of labor bargaining forums, it is still a matter of importance in shaping social relations on the factory floor. One employee complained that the skills training offered on many occasions pre-supposes a new worker or takes the form of general induction.

Some training is geared towards induction, but termed "skills training," but it doesn't facilitate adequate upward mobility for workers. They tend to involve safety, team building, kaizen, et cetera, but these are daily issues. Not issues that facilitate the upward mobility of workers in terms of the pay scale. [Participant 4, 2013, interview]

The other critical dimension is *interactions between workers and dilemmas that arise*. In my interviews with the participants, I found that, contrary to gen-

eral views, skill is not a purely technical or linear set of processes because it produces spaces for workers to interact in complex ways, often producing contestations and challenges to the insertion of new technology. Barchiesie (1998:107) maintains, contending perspectives and paradigms have often shared a view of production under capitalism as an area of disarticulation of individual lives and meanings and new articulations around the specific organizational, spatial, and temporal requirements of factory life. As I have shown above, in Company A, the high levels of automation led to intense restructuring, which led to the reorganization of work and, in some areas, the reduction of staff.

The company adopted a strategy of *line rebalancing* to divide the work of one employee among four employees. This meant that even highly skilled workers had to be downgraded to the level of operators just to keep their jobs. This undermines the principle of solidarity among the workers and sees skill as a matter of hierarchies rather than a basis of uniting the workers as a social force. These tensions that arise because of restructuring demonstrate that beyond conflict and control there is a range of other areas of contestation within factory life that are relevant to the skills of workers and circumscribe the nature of social relations amongst workers. The quest for skills often results in recruits being perceived to have greater benefits than longer-serving employees. One worker suggests that:

Certain skills, like inspectors or metal finishers, don't seem to enjoy the same recognition as the new recruits who are technologically advanced. As a result, the union has had to bring in expert advice to assist in negotiations with management about the content of skills and the link to pay grades. [Participant 5, 2013]

The skills issue is tightly connected to recognition and progression and is, therefore, a real issue of contestation between workers, but workers are also able to use it as a terrain of confrontation of the management within the continuum of acceptance and resistance that Barchiesie (1998) suggests.

Discussion and Conclusion

In this paper, I have shown how the deskilling thesis remains relevant in the context of automotive assembly in South Africa. Skills researchers have tended to study the relationship between education and work in ways that explore collaboration and responsiveness without providing us with perspectives on the changes in the actual content of work. As Thompson and Smith (2009) have argued, Braverman's thesis on skill degradation through the continued separation between head and hand (conceptual and operational skills) misses new areas of accumulation that are constantly innovated within capitalism through its international expansion and technological dynamism. One key area is the qualitative intensification of labor through more flexible and expanded use of worker capacities and tacit knowledge (Thompson and Smith 2009:260). The deskilling debate has tended to be confined to a much narrower set of institutional relationships of work and, as a result, much of the contemporary research in labor studies tends to overlook the complexities of the social and political context that shapes the labor process, as well as experiences of workers. For example, some recent writing on deskilling (Machacek and Hess 2019; Richardson and Bissell 2019) concentrate on issues such as value chains, manufacturing and services industries, digital skills need, et cetera. However, developing countries face the acute challenge of the need for a link and extension of the concepts of technology and deskilling beyond traditional institutions of work.

Deskilling is central and endogenous to the broader processes of capitalist accumulation and, therefore, cannot be treated as a purely technical development as it is tied to the political-economic structures that shape society.

The evidence coming out of the findings points us to an interesting perspective about the degree to which automation technologies are labor-saving or labor-augmenting. Concerning the environment of vehicle assembly, Benanav (2019:9) states that “With labor-augmenting technologies, a given job category will continue to exist, but each worker in that category will be more productive. For example, adding new machines to an assembly-line producing cars may make line workers more productive without abolishing line work as such. However, fewer workers will be needed in total to produce any given number of automobiles. Whether that results in fewer jobs will then depend on how much output—the total number of cars—also increases.” This points to the long-term tendencies I referred to in the con-

ceptual discussion, as well as the views expressed by some workers that I interviewed. At the core of this is what Spencer (2016) highlights—that the political-economy context is important in understanding the role of technology in society and helps us to transcend a narrow focus on the instrumental aspects of the power of computers, as these computers never operate outside of the wider societal context.

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