INTERNATIONAL JOURNAL OF Training and Development

International Journal of Training and Development 00:00
ISSN 1360-3736
doi: 10.1111/ijtd.12118

Explaining differing perceptions of employees' skill needs: the case of garment workers in Ethiopia

Shoko Yamada, Christian S. Otchia and Kyoko Taniguchi

Abstract

The Ethiopian economy has grown significantly and the government has prioritized industrial skills development and expanded technical and vocational education and training (TVET). However, mismatches between the skills available and the skills required are widespread and the unemployment rate for TVET graduates is high. Little scholarly effort has been made to empirically identify the exact types and domains of skills in which these supply–demand mismatches happen. The present study relies on interviews with 30 vocational trainers, 19 employees, 13 factory managers and 3 garment industry experts. To measure the perception gaps between the supply and demand sides of worker skills and explain why mismatches occur, we conducted an assessment in which assessors from among the factory managers and vocational trainers along with the three industry experts concurrently graded the garment-manufacturing vocational skills of the same workers. For this purpose, we developed a unique instrument that captures the knowledge and skills of workers in real work environments. The analysis reveals that TVET trainers expect students to have comprehensive skills and grade the skills of workers more generously, whereas factory managers expect not variety but quality, and score workers' performance more critically. Differences in the educational backgrounds and practical experience of assessors contribute to these gaps. The evidence from this study suggests that the vocational skills assessment instrument we have developed for our research is valid and can serve as a basis for future large-scale performance assessments.

❒ Shoko Yamada, Nagoya University, Japan. Email: syamada@gsid.nagoya-u.ac.jp. Christian S. Otchia, Kwansei Gakuin University, Japan. Email: otchia@kwansei.ac.jp. Kyoko Taniguchi, Nagoya University, Japan. Email: kyoko.taniguchi1909@gmail.com

Introduction

Over the past few years, the interplay between vocational training and the demand for skills has become a high-priority concern among academics and policy makers (Kleibrink, 2013; Müge & Andrews, 2015; World Economic Forum, 2014). The research to date, however, has tended to focus on the consequences of skills mismatch (Bauer, 2002; McGoldrick & Robst, 1996) rather than on identifying the exact types and domains of skills in which the mismatches occur. Moreover, among the limited works that have tried to assess the skills mismatch, the majority have relied on the self-reported skills of workers as the basis of comparison with demanded skills (Robst, 2007). However, because they are based on subjective and individual judgment, these methods are prone to bias (Allen *et al*., 2013; Hartog, 2000). Although there is limited understanding of how to objectively assess the actual skills of workers, information is also lacking regarding employers' perceptions of new workers' competencies and the matches or mismatches between these perceptions and training providers' perceptions about required skills. Given this situation, this paper aims to contribute to this growing area of research by objectively assessing workers' skills through practical tests in relation to the gap in perceptions about expected skills between training providers and employers.

This research focuses on the Ethiopian textile and garment industry for several policy reasons. The most recent data rank Ethiopia as the second-largest foreign direct investment destination among least-developed countries. The textile and garment industry is the fastest growing and most highly prioritized sector in the country, and it has a great potential for employment growth. According to government statistics (Central Statistical Agency of Ethiopia, 2013), this sector contributes nearly 1.5 per cent of gross domestic product (GDP) and 9.01 per cent of the country's industrial production. As for labor demand, the sector provides about one-fifth of total manufacturing employment, with approximately 45,000 workers. Accordingly, the technical and vocational education and training (TVET) institutes in the country also assign the largest number of trainers and students to textile-related programs. In the city of Addis Ababa in 2013, out of 9830 TVET trainees, 2908, or 29.6 per cent, were in textile-related programs, followed by construction and automotive programs (Addis Ababa City Administration TVET Agency, 2015). In spite of this effort, a large number of TVET graduates in these programs are left unabsorbed into the labor market. As of 2011, fields in which more than half of graduates were unemployed included weaving and textile engineering, together with woodworking and carpentry and plumbing. At the same time, more than 50 per cent of vacancies in large- and medium-sized firms are expected to be filled by skilled production workers, compared with fewer than 10 per cent by managers and professionals who hold educational certificates in the liberal arts (Geiger & Moller, 2015). This fact points to a mismatch between labor demand and training, regardless of the expanded demand for and effort to train skilled workers, as well as an urgent need for adequate policy measures to mitigate it.

This paper contributes to the literature on skills development in at least two important ways. First, empirical work on the mismatches between the demand and supply sides of worker skills typically includes little information about the domains in which mismatches occur and why they occur. In a review of 27 studies drawn from data from dozens of countries, Cunningham and Villaseñor (2016) report that a wide number of studies have centered around a priority ranking of the most important skills (Burrus *et al*., 2013; World Bank, 2014; Zemsky, 1997) and a ranking of the perceived gaps. The majority of these studies ask employers to identify the most important skills that they need in their employees (McKendrick, 1986), rank a predetermined list of skills in order of importance (Andreasson, 2009; Mourshed *et al*., 2012; Ogier, 2009,World Bank, 2011) or rank the most lacking skills according to how large the gap is between observed and expected skills (Arnhold *et al*., 2011; Close, 2012; Martin *et al*., 2008). These studies have tended to simply report employers' stated skill preferences, lacking objectivity and a link between what employers prefer and what actual tasks workers are doing. In contrast, our paper provides a unique contribution in that we ask different parties

(employers, TVET trainers and TVET experts) to concurrently and objectively evaluate the same set of skills of relatively inexperienced workers performing in the actual work setting and to compare that evaluation with the preferred skills they express in a questionnaire. By doing so, we investigate the exact domains of supply–demand mismatches and the reasons they occur.

Our second and more important contribution is the development of a module to assess vocational skills and attitude toward work in a developing-country setting. The assessment of learning outcomes has become a hot issue in recent years, particularly for learners in developing countries. Since the quantitative expansion of formal education, many people have expressed concern that simple access to schooling is not enough and that the outcomes of education, whether or not it is in a basic school, a TVET institution, or a university, have to be of high quality and relevant to students' actual life needs. TVET system reforms, which many countries are going through, are taking place along this line of discussion about improving the relevance of skills and knowledge. Meanwhile, the tools to assess people's competency in solving real-life problems in the actual work setting are not well articulated. Moreover, most of the existing skills assessments focus on academic and competency testing, using written tests to measure individuals' knowledge in the traditional academic subject areas such as mathematics, writing and science. There are few operational cases of large-scale assessments of learning outcomes that assess whether individuals have the knowledge and skills required to perform effectively in a job or occupational area. The Programme for International Student Assessment (PISA), conducted by the Organisation for Economic Co-operation and Development (OECD), is the leading multicountry test[1] of 15-year-old students' problem-solving skills in science, mathematics, reading and finance. However, in the context of developing countries, such assessments are almost nonexistent.[2] Some observers have expressed concern that Western assessment tools may not be valid in other countries due to cultural and contextual differences, not only in assessment techniques but also in the overarching constructs to be measured.[3] Our paper contributes to the current discussion by providing a framework to assess garment-related vocational skills in a developing-country context. Taken as a whole, our module is designed to capture the evaluee's stock of accumulated knowledge in a real working environment and to involve more complex levels of thinking than traditional tests. Thus our vocational skills assessment will serve as a basis for future large-scale performance assessments in developing countries.

The remainder of the paper is organized as follows. The next section contains a short description of the mismatch of labor demand and TVET in Ethiopia. Thereafter, we present the methodology for data collection and highlight key features of the vocational skills assessment. The following sections introduce the empirical model and discuss estimates of the perception gaps and skill expectations. The final section offers conclusion.

The mismatch of labor demand and TVET in Ethiopia

Driven by an intensive public infrastructure program as well as strong service and agriculture sectors, Ethiopia has achieved one of the fastest economic expansions in sub-Saharan Africa, averaging 10.9 per cent per year between 2004 and 2014 (Moller, 2015). However, regardless of the general improvement in its economic state, Ethiopia faces challenges to its value-added manufacturing and job creation. Manufacturing still

[1] Seventy economies, including countries and regions of countries, took part in PISA in 2015 (OECD, 2016).

[2] Rao *et al*. (2014) developed a culture-sensitive competency assessment test for children ages 3–5 in the East Asia and Pacific region. Although the assessment module is specifically designed for early childhood, the authors' approach to constructing it has general implications for the measurement of noncognitive skills in developing countries.

[3] In response to these concerns, the OECD started to design the new PISA for Development in 2013, but that instrument is yet to be operational.

represents only 4 per cent of GDP, whereas the agriculture and service sectors together account for 90 per cent. Unemployment has remained high, especially among youth in urban areas (World Bank Group, 2015). The urban youth unemployment rate was 27 per cent in 2005 and 24 per cent in 2011, for a meager annual reduction rate of 1.9 per cent. With regard to duration of unemployment, it is worth noting that 30 per cent of young people spend more than 12 months unemployed before finding a job (Central Statistical Agency of Ethiopia, 2014).

Beginning a few years after the turn of the millennium, the Ethiopian Government initiated a fundamental reform of the TVET system and increased the number of enrollments in TVET institutions. Two interrelated aspects of this reform are worth noting. First, the reform set the pace for an outcome-based TVET system, whereby trainees are trained to attain occupational competencies rather than following a traditional curriculum. Competency-based training follows occupational standards developed by both trainers in vocational training institutions and representatives of industry. Another interesting aspect of this reform is that it pledges to provide cooperative training between vocational training institutions and firms as a means of increasing the relevance of training and facilitating the transition from school to work. The cooperative training system aims at providing 70 per cent of training content at the industry site and 30 per cent in the vocational institution. Spurred by the goal of making Ethiopia a middle-income country by 2025, the government emphasizes the training of mid-level technicians (Government of Ethiopia, 2005). Therefore, overall TVET enrollment has grown at an annual rate of around 30 per cent since the middle of the last decade, having climbed from 106,336 in 2005/2006 to 308,501 in 2009/2010 (Krishnan & Shaorshadze, 2013). In tandem with the industrial policy of prioritizing the textile and garment industry, TVET institutes have assigned the largest number of trainers and students to textile-related programs.

Regardless of this emphasis on TVET, however, the unemployment rate remains high, particularly among TVET graduates. Textile engineering is one of the areas in which more than half of graduates remain unemployed, together with woodworking and carpentry, weaving and plumbing (Central Statistical Agency of Ethiopia, 2014). Some analysts argue that one of the causes of the mismatch between training and employers' expectations is the inability of TVET institutes and their curricula to catch up with the fast pace of change in the economic environment and the consequent change in demanded skills (Wolter & Ryan, 2011). Others point to problems in the assignment system for students entering TVET programs. Krishnan and Shaorshadze argue, based on their interviews with TVET graduates, that the Ethiopian Government is 'command driven' and assigns students to TVET programs proportionally based on its manpower development plan, without considering students' own preferences. Those students who are forced to learn skills for a sector not of their choice have little motivation to look for jobs in that sector. Matching TVET graduates with industry (the school-to-work transition) is another problem. Although there are public services that provide information for job seekers, many people find jobs through personal connections. Also, regardless of the increased internship of TVET students in the private sector (cooperative training), many employers are hesitant to employ interns because of the mismatch between their expectations and students' skills (Edukans Foundation, 2009; Hailu, 2012).

Given that improved relevance is the major objective of the current TVET reform, it is natural that there is a growing discussion about matching vocational training with industrial labor demands. At the same time, the research and policy debates to date have tended to focus on the determinants and consequences of skills mismatch rather than identifying the exact types and domains of skills in which the mismatches occur. Therefore, we do not really know whether the newly developed occupational standards have produced workers with skills more appreciated by employers than before. Further, we also do not know which domains of knowledge require more training and which ones are not in much demand.

Ethiopia's 2010 Education Sector Development Plan IV emphasizes the importance of assessing TVET students' learning outcomes (Federal TVET Agency of Ethiopia,

2010; Government of Ethiopia, 2010). The outcomes of competency-based TVET, which Ethiopia has adopted, are to be assessed based on the occupational standards, which are composed of 'units of competence' set for respective levels of qualification in a framework from the production to the management level. *Competency* in this context means 'the ability to perform an operation or activity within an occupation to a specified standard' (Federal TVET Agency of Ethiopia, p. 7). The national qualification framework is based on the assumptions that the occupational standards developed with input from industries are relevant to work contexts and that the assessment of students' skills and certification based on the results indicate graduates' preparedness for the world of work. However, there are some issues with these assumptions. First, the passing rate for assessments based on occupational standards is less than 20 per cent (Krishnan & Shaorshadze, 2013). Therefore, if one accepts the results of the assessment straightforwardly, TVET institutions are failing to produce very many competent graduates. Second, although the training is said to be outcome-based, the current assessment system looks at test takers not in the actual work setting but in the assessment center, called the 'center of competence'. Also, despite the fact that problem-solving skills in the actual work setting comprise not only vocational skills in the use of the hands but a complicated combination of cognitive, noncognitive and behavioral skills, assessments still focus exclusively on the performance of assigned tasks. Because they are based on the units of vocational skills to be checked, the occupational standards also fail to address the nexus of contextualized skills.

Vocational skills assessment

Design of the data collection tools

The current research aims to capture the multiple skill dimensions of the garment production worker, given the recognized limitations of competency assessment of vocational skills in Ethiopia. Our assessment was uniquely designed to combine information on garment workers' production skills with data on the skills factory managers and trainers perceive as important. Although it assessed factory workers' work-related skills, it also asked employers and trainers about their desired levels of cognitive, noncognitive and work-related skills in order to compare differences in expectations between employers and trainers – that is, to look at both the demand and supply sides of worker skills. By doing so, this assessment can examine the domains of supply–demand mismatches along multiple skill dimensions.

The main purposes of the questionnaire were to identify (1) whether or not there is any gap in the expectations for workers' skills between the supply and demand sides; (2) whether or not the expectations from the labor market and from the training institutions correspond to the self-evaluation of workers; (3) whether or not stakeholders' demographics and professional backgrounds affect their perceptions of skills. For these purposes to be fulfilled, as shown in Table 1, items on expectations for cognitive, noncognitive and work-related skills were made identical between the questionnaires for factory managers (a) and TVET trainers (b), whereas items on respondents' backgrounds and their institutions/firms differed between the two questionnaires. Questionnaire (c) asked workers to assess their own work-related skills and behavior at the workplace.

Samples and arrangements for the research

For the purpose of this research, we developed a module to assess vocational skills in garment production, using Ethiopia as a case study. Among various subsectors of the textile and garment industry in Ethiopia, garment production is very labor intensive and generates about 35 per cent of gross value added, whereas knitting, weaving and spinning represent only 20, 15 and 15 per cent, respectively (Chavan, 2013). Therefore, to capture the characteristics of skills required in the part of the sector that involves the largest number of workers and economic outputs, participants in the research were selected from the garment production units of the TVET institutions and factories in the capital city, Addis Ababa and its vicinity.

Table 1: Structure of questionnaires

Questionnaire for factory managers	No. of questions	Questionnaire for TVET trainers	No. of questions	Questionnaire for workers	No. of questions
Background of respondent	5	Background of respondent	9	Background of respondent	7
Characteristics of the factory	12	Students' job search process	3	Background of the family	3
Training of workers	6	Linkage between TVET and industry	2	Training experience	2
Process of workers' recruitment	5			Work experience	6
Perceived need for cognitive and noncognitive skills			29	Current job	12
Perceived need for work-related skills in apparel production			20	Work-related skills in apparel production	5
				Attitude at work	11
Total	77	Total	63	Total	46

TVET = technical and vocational training.

Table 2: Research tools and participants

Research tool	Characteristics	Participants	No. of participants
Questionnaire			
(a)	The demand side	Factory managers	13
(b)	The supply side	TVET college trainers	30
(c)	The workers	New factory employees	19
Skills assessment	Assessment takers	New factory employees	19
	Assessors	Factory managers	3
		TVET college trainers	3
		TIDI experts	3

TIDI = textile industry development institute; TVET = technical and vocational training.

During the first fieldwork in December 2015, the team contacted 35 garment factories listed as members of the Ethiopian Textile and Garment Manufacturers Association and based in Addis Ababa or its vicinity. Out of 35 factories contacted, 13 agreed to take part in the research (Table 2). We visited these factories to administer the survey for factory managers, denoted as questionnaire (a). We also asked managers to nominate a few workers who were relatively new to the factory (with between 1 and 3 years of experience) to take part in the skills assessment in January 2016. We also asked them, if possible, to mix workers who had graduated from TVET and those who had not.

To obtain the views of TVET providers, after reviewing statistics from the federal TVET agency on the 27 public TVET institutes in Addis Ababa, we selected the top five in student enrollment in garment production programs, which prepare students for Levels 1–4 of the Ethiopian national garment occupational standards. According to statistics for 2014/2015, the numbers of garment production students in these schools were as follows: Institute 1: 312, Institute 2: 368, Institute 3: 378, Institute 4: 368 and Institute 5: 802 (Addis Ababa City Administration TVET Agency, 2015). At these five institutes, we administered questionnaire (b), the survey for TVET trainers, to a total of 30 garment production trainers.

In January 2016, 19 relatively new employees came to one site to take part in the skills assessment. They were also asked to fill out a questionnaire on their personal and family background, training and work experience and attitude toward work, denoted questionnaire (c). To compare assessors' tendencies in grading the workers' performance, we invited equal numbers of assessors from three categories: three TVET institute trainers; three factory managers; and three experts from the Textile Industry Development Institute (TIDI), a training and research institute under the federal Ministry of Industry. In addition to information from the demand and supply sides, assessment by the TIDI experts was expected to add the perspective of industry specialists who are in a neutral position in the labor market.

The skills assessment examined whether the workers had the skills that both the supply and the demand sides expected. The purpose of having three categories of assessors at once was to let them assess the same group of workers concurrently. The questionnaires allowed us to compare differences in expectations by the assessors' institutional affiliation, experience, educational background and so on. However, expressed expectation is not enough unless we examine how it is translated to the actual evaluation of workers in front of the assessor. As mentioned before, one of the challenges common among scholarly efforts at comprehensive skills assessment is to control the bias that results from subjective evaluation. Thus, one of the methodological strengths of this study is its design of having the same workers assessed by different groups of assessors at the same time. This design also allowed us to contrast stated expectations with actual evaluations.

Vocational skills assessment

A methodological strength of our instrument is that it was based on the core competencies identified in the Ethiopian occupational standards, whereas the activities were relatively simple and took only 30 min per assessment taker. With the advice of experts on quality management within garment factories, we prepared groups of activities to assess skills in four areas: (1) pattern development; (2) analysis of garment structure; (3) machine sewing; (4) finishing of the garment. The points of assessment included the following (details are shown in Table 3):

1. Pattern making: we gave a shirt to workers and assessed whether they could draw the pattern from which its sleeves were cut. The assessment comprised four items, examining workers' knowledge of the pattern's key elements, such as armhole, sleeve cap and sleeve bottom.
2. Garment structure: we asked workers to compare two shirts and explain how their construction differed. This assessment had six items, mostly concerning the skills of accurately measuring important parts of the garment and comparing two shirts accordingly.
3. Sewing: these activities tested the skills of sewing small pieces of cloth using the sewing machine. The assessment was made on five items, including the straightness and consistency of stitch, finishing without wrinkles or twists and appropriate preparation of the needle and threads.
4. Finishing: finishing skills are those of ironing and folding, assessed on four items.

Assessors used a five-point Likert scale, ranging from 1 = *very unsatisfactory* to 5 = *highly satisfactory*, to grade the performance of workers. Across the four activities, there were 20 assessment items. Instead of giving detailed scoring guidance through standardized assessment criteria, we let the assessors grade the workers' performance based on their own judgment. This decision was made for consistency with our objective of examining differences between employers and trainers in the relationship between their perceptions about skills and their assessment of a specific worker's skills.

As mentioned earlier, the contents of our assessment were developed based on the Ethiopian occupational standards and were validated by experts on quality management in garment production. After the data were collected, we conducted exploratory factor analysis (EFA) for all 20 points of assessment so as to cross-check their validity. EFA is generally used when there is no a priori assumption about the underlying dimensionality of the construct. Therefore, it was possible that the factors identified as a result of EFA would not match with the groups of skills we intended to measure. However, the outcome of EFA was in line with the four activities included in the assessment. We determined the number of latent factors to retain based on the magnitudes of their eigen values and on a screen plot. Then, in the analysis, we used quartimin rotation with Kaiser normalization to rotate the factor loadings so that, by construction, each point of assessment would load mostly on one factor. Interestingly, Table 3 shows that each point of assessment loaded as expected within the different factors or domains. The four domains of vocational skills in garment production are confirmed by the extracted factor structure, which accounts for about 97 per cent of total variation. As demonstrated by the high loading value, our module also satisfies convergent validity, whereby each point of assessment within a given domain is associated with the points for other items in the same domain.

Next, we tested the internal consistency of items. We used Cronbach's alpha, which is one of the most widely used measures of the extent to which a set of items measures a single, unidimensional latent construct. Also shown in Table 3, the Cronbach's alpha for all 20 points of assessment is 0.8683, meaning that all the points of assessment measure a single unidimensional construct, that is, garment vocational skills. Furthermore, we evaluated the reliability of the four domains of vocational skills by computing the Cronbach's alpha for each domain. The results indicate good internal consistency for the four domains of vocational skills.

Finally, we constructed two different indexes for each domain of vocational skill assessment. Assuming an equal weight for all items, we constructed a simple score that averaged all the points of assessment, using the predefined skill domains from the

Table 3: Psychometric properties of vocational skills assessment

Point of assessment	Domain	Factor 1	Factor 2	Factor 3	Factor 4	Uniqueness	Cronbach's alpha
1_1 Can draw the rough shapes of the right and left sleeves	Pattern making	0.107	0.126	0.183	**0.785**	0.323	0.800
1_2 The drawn patterns distinguish the difference of the curve for the front and back sides of the sleeve	Pattern making	0.098	0.199	0.307	**0.658**	0.423	
1_3 Can measure and write the rough length of **armhole**	Pattern making	0.124	−0.004	0.198	**0.745**	0.391	
1_4 Can measure and write the rough length of **sleeve cap**	Pattern making	0.016	−0.018	0.242	**0.222**	0.892	
1_5 Can measure and write the rough length of **sleeve bottom**	Pattern making	0.074	0.024	0.180	**0.679**	0.501	
2_1 Width of the body sections of two shirts	Garment structure	0.019	0.184	**0.671**	0.167	0.488	0.779
2_2 Length of the body sections	Garment structure	−0.081	0.138	**0.604**	0.239	0.553	
2_3 Diameters of the sleeves	Garment structure	0.131	0.018	**0.446**	−0.110	0.771	
2_4 Length of the sleeve from the top	Garment structure	0.206	0.104	**0.633**	0.133	0.528	
2_5 Size of the neckline	Garment structure	0.259	0.015	**0.511**	0.165	0.644	
2_6 Width of the chest	Garment structure	−0.003	0.102	**0.629**	0.319	0.492	
3_1 Straightly and consistently 1cm inside the edge	Sewing	**0.672**	0.049	0.086	0.204	0.498	0.865
3_2 Without wrinkles and/or twists	Sewing	**0.824**	0.130	0.062	0.082	0.294	
3_3 With an appropriate tension of the needle and bottom threads	Sewing	**0.732**	0.205	0.047	−0.047	0.417	
3_4 Straight and consistently within 1.0–1.5 mm from the hem	Sewing	**0.671**	0.114	0.217	0.057	0.486	
3_5 Nicely done with a proper thread tension	Sewing	**0.781**	0.207	0.124	0.083	0.325	
4_1 The shirt is ironed without wrinkles and distortions	Finishing	0.322	**0.768**	0.134	0.052	0.286	0.884
4_2 Both front and back sides of the shirt are ironed clearly	Finishing	0.205	**0.849**	0.106	0.055	0.224	
4_3 Parts such as pocket, placket, tucks and collar are ironed clearly	Finishing	0.189	**0.799**	0.152	0.104	0.292	
4_4 The shirt is folded flat and clearly	Finishing	0.140	**0.661**	0.245	0.105	0.472	
Proportion of variance (EFA)		0.280	0.238	0.228	0.221	–	
Test scale	–	–	–	–	–	–	0.868

EFA = exploratory factory analysis.

occupational standards as validated in the factor analysis. To test the robustness of our measures, we also constructed an alternative measure that used the factor loadings of the EFA as a weight to calculate a weighted average of the four domains of garment vocational skills.

Procedures for data analysis

This section discusses our strategy for estimating whether there is any mismatch in the perceptions of garment-specific vocational skills between training providers and employers. Further, it discusses our approach to matching the factory managers' and TVET trainers' questionnaire responses with their assessment of workers' skills in order to analyze how their stated skill expectations compare with their actual evaluations.

Estimation method

We are particularly interested in the gap in perceptions among stakeholders about four garment production skills. To contrast differing perceptions of workers' skills between TVET trainers and employers, we examined the effect of evaluators' attributes on their evaluations of workers' performance. A well-established approach in the empirical education literature to explain individual performance has been to regress individual achievement on personal characteristics as well as school, teacher and state characteristics (Hanushek, 1979). Following this literature, we model assessment performance scores (A) of worker i graded by assessor j as a function of assessor and worker characteristics, using the following equation:

$$A_{ij} = \alpha_{ij} + \beta b_{ij} + \gamma X_{ij} + \lambda S_{ij} + e_{ij} \quad (1)$$

where b represents our primary predictor of interest and equals 1 if the assessor is a TVET trainer or TIDI expert, and 0 if an employer;[4] X includes controls for the age, gender, education and experience of the assessor; S is a vector of worker characteristics; and α is an individual intercept specific to assessor j. Conventionally, educational outcome equations like equation (1) have usually been estimated using multilevel regression models due to the nested structure of the test score data (Rabe-Hesketh & Skrondal, 2012; Strand, 2014). However, we believe that ordinary least squares (OLS) methods are well suited to our analysis, for two reasons. First, we are aware that OLS techniques in the presence of clustered data may yield biased estimates because the responses of the same individual at different times may not be independent, even after conditioning on the covariates (Rabe-Hesketh & Everitt, 2004). The justification for OLS in our study lies in the fact that we designed the experiment such that the same individual is evaluated by different assessors at one time point. Thus, the only source of variation in individual performance scores is the perception differences among assessors, who also differ in their backgrounds. In this setting, the performance scores of a given student graded by different assessors are net of the cluster effect and likely to be uncorrelated, validating the use of OLS. The second factor in favor of OLS is that our attempt to estimate the null model of the multilevel regression yields a small intra class correlation (less than 11 per cent), implying that there is no reason to estimate a mixed-level model. Note also that the goal of our estimates is not to relate assessors to worker achievement scores but to measure how the differences in assessors' grading patterns are related to the differences in their background characteristics. But before proceeding to estimate the empirical model, it will be helpful to discuss the structure of the data.

[4] Although we involved TIDI experts as assessors based on the assumption of their neutrality between the supply and demand sides, their assessment patterns and attributes were similar to those of TVET trainers. Therefore, for the analysis, we decided to treat TVET trainers and TIDI experts as one group and considered them as representing the perspective of trainers (the supply side).

Table 4: Pairwise correlations of grading scores

	Combined	Pattern	Structure	Sewing	Finishing
Combined	1				
Pattern	0.6918*	1			
Structure	0.7967*	0.4627*	1		
Sewing	0.6638*	0.2393*	0.2744*	1	
Finishing	0.6454*	0.2362*	0.3358*	0.4083*	1

Note: *Pairwise correlation is significant at 5% level (two-tailed).
Source: Authors' computation.

Skills expectations and assessment data

As mentioned earlier, the questionnaires for factory managers (a) and TVET/TIDI professionals (b) shared 29 questions on expected levels of cognitive, noncognitive and work-related skills. Of these, this paper will focus on the 20 questions on work-related skills. In particular, we focus on questions related to the four categories of work highlighted in the worker skills assessment: pattern making, analyzing the structure of a garment, sewing and finishing. As a result, we used the following items from questionnaires (a) and (b) for our analysis of the four categories of skills: (1) pattern-making skills – skills to design garments, develop a pattern manually and develop a pattern using a computer-aided design system; (2) analyzing garment structure – skills to measure the body and to mark, lay out, and cut fabrics; (3) sewing – skills of both simple and complicated sewing; and (4) finishing – skills to conduct apparel finishing and apply quality control. We calculated average scores by category as well as total average scores, the latter denoted as 'combined scores'.

In addition, because the aim was to study how assessors' expectations regarding garment production skills are related to their grading patterns, we matched the 20 questions with the assessment score data. Initially, we had questionnaire responses from 13 factory managers and 30 TVET/TIDI professionals, for a total of 43 samples for these two categories. Because six individuals who answered questionnaires also took part in the workers' assessment, we matched them to the assessors who did answer the questionnaire by gender, age, years of experience, occupation and education. We predicted the garment skill expectations of unmatched assessors using the estimated coefficient of an ordered logistic regression model. The model was estimated from the questionnaire for factory managers and TVET/TIDI trainers, with gender, age, years of experience, occupation and education as a set of independent variables.

Results and discussion

Descriptive results

For the analysis, we normalize the factory workers' unweighted scores on the assessment to have a mean of 0 and a standard deviation of 1 for the total sample. In addition to the separate scores for the four categories of tasks, we also include their combined score in the analysis, because the four tasks exhibit relatively low but significant correlation. The interrelationships among the assessment scores (Table 4) show positive and significant associations between pattern and structure (46.27 per cent), sewing and finishing (40.83 per cent), and to a lesser extent, structure and finishing (33.58 per cent). Although sewing skills are not so much correlated with the skills of analyzing garment structure and making a pattern, they are significantly correlated with finishing skills. Based on these outcomes, one can argue that garment and textile factory workers have skills mainly in sewing, ironing and finishing products, but not so much in analyzing the structure of garments or making patterns.

Turning now to the distribution of the assessment scores, it is worth noting the differences in competencies among the sampled factory workers. As seen in Figure 1, the

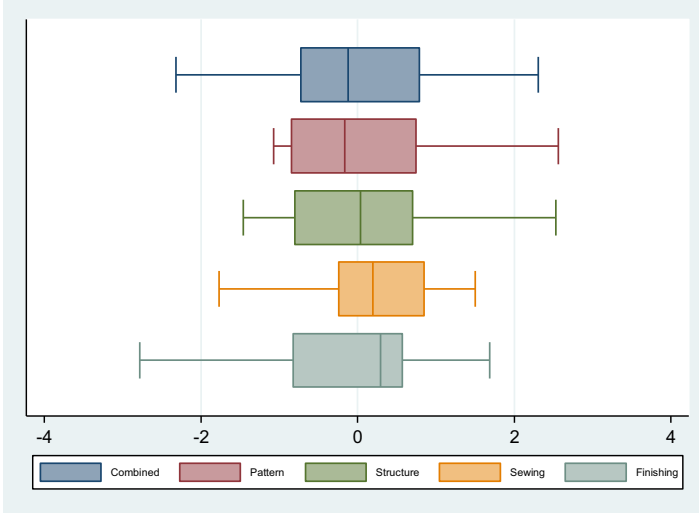

Figure 1: Distribution of assessment scores. [Colour figure can be viewed at wileyonlinelibrary.com]
Source: Authors' computation.

distribution of sewing and finishing assessment scores is skewed to the right, with few workers receiving low scores. On the other hand, pattern-making assessment scores and, to a lesser extent, structure analysis scores are skewed to the left, showing that a limited number of workers attained high scores. In pattern making, few workers could carry out the required tasks, and the differences in capacity among workers were rather obvious. One of the significant reasons for the low performance in pattern making is that it is not a task frequently exercised by relatively new workers within the factory. Some interviewees in Addis Ababa argued that patterns are generally sourced from a large brand or created by clients, and most of them are standardized for use in many operations in various countries. Moreover, some medium-sized factories can afford to hire a highly skilled designer – usually an expatriate – with advanced knowledge of computerized pattern making to create patterns in a specialized section of the factory.

This evidence corroborates our previous discussion and reinforces the conclusion that sewing and finishing constitute the bulk of skills used in garment factories. More important, these results indicate different tendencies in the composition of skills between those trained in TVET institutes and those trained on the job.

Gaps in the perceptions of garment production skills

Now we turn the analysis to the main question of our research, whether there is any difference in the pattern of skills grading between the supply and demand sides of garment production. The supply side is represented by trainers (including both TVET college trainers and TIDI trainers) and the demand side by employers. As explained earlier, we originally treated TVET and TIDI trainers separately, assuming that TIDI trainers would represent a neutral position between the supply and demand sides. However, because their grading patterns were similar to those of the TVET trainers, we decided to consider the two groups together.

Table 5 reports the results of estimating equation (1) for the combined assessment score (Column 1), pattern items (Column 2), structure items (Column 3), sewing items (Column 4) and finishing items (Column 5). The dummy variable for the assessor's being a TVET/TIDI trainer provides a direct test for the existence of perception gaps between trainers and employers. This coefficient is significant in the model for combined assessment score, structure, sewing and finishing, meaning that there are

Table 5: Estimation results

	(1) Combined	(2) Pattern	(3) Structure	(4) Sewing	(5) Finishing
TVET and TIDI trainers	0.284**	0.110	0.419***	0.314***	0.396**
	(0.112)	(0.119)	(0.126)	(0.110)	(0.165)
Worker control	Yes	Yes	Yes	Yes	Yes
Factory control	Yes	Yes	Yes	Yes	Yes
Constant	1.515	2.132*	0.153	5.754***	0.188
	(1.150)	(1.184)	(1.430)	(1.841)	(3.051)
N	171	171	171	171	171
R^2	0.753	0.708	0.672	0.821	0.630

Note: All estimates control for years of experience, age, gender and education.
Source: Authors' computation.
Robust standard errors in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.
TIDI = textile industry development institute, TVET = technical and vocational training.

perception mismatches in these tasks. As explained above, the scores for pattern making are generally low, resulting in a lack of statistically significant impact on pattern making of any variables, including the variable for trainer–employer difference.

The positive measure of the TVET/TIDI trainer coefficient indicates that trainers tend to have generous grading criteria, whereas employers tend to be critical by evaluating lower. The 0.28 coefficient in the model for combined score, for instance, implies that being evaluated by a TVET or TIDI trainer after being evaluated by an employer would raise the assessment score by 0.28 standard deviations. In sum, except for pattern making, where differences are not seen because of generally low performance, the trainers and employers demonstrate clearly different grading attitudes.

One reason for the difference between trainers and employers can be attributed to the different approaches to training on the respective sides. TVET schools' training aims to develop all-rounders who can follow the steps of garment making from measuring the body of a customer to making a pattern, sewing and finishing the garment, so that trainees can be either self-employed or employed at a factory. For instance, the TVET model curriculum for Level 1, used in sample schools, allocates 24.28 per cent of total time to pattern making and laying out and cutting fabric, 25.97 per cent to sewing and 8.72 per cent to behavioral skills, among others. Level 2 allocates no time to sewing but puts more emphasis on pattern making and finishing, which account for 39.92 and 30.11 per cent, respectively, of total time[5] (Addis Ababa City Administration TVET Agency, 2010). Meanwhile, when factories employ new workers, they provide initial intensive training that normally last for approximately two weeks. After that, workers are mainly initiated into sewing. Workers learn other skills, such as ironing and embroidery, as they become more experienced. Therefore, the bigger the factory, the less exposure newer workers have to pattern and structure, whereas those in smaller factories tend to perform a wider variety of functions.[6] Few factories give reading and writing tests, because their main goal is to supply ready manpower to the sewing lines. These differences in the focus and mode of training reflect the differing expectations in the school and in the factory. Because they assess the quality of work on a commercial

[5] This is probably because students are supposed to do cooperative training in factories for about 70 per cent of their training time. However, several informal reports indicate that the implementation of cooperative training faces several constrains, reducing its effectiveness.

[6] For instance, one participant in the skills assessment had no experience in ironing, despite the fact that she had been working in a factory for a couple of years.

standard, factory managers tend to be severe in their assessment, particularly on sewing. TVET trainers, on the other hand, are educators who assess performance in comparison with the average of the cohort and based on the criteria of the Ethiopian occupational standards, which are quite comprehensive.

Second, the differences in education and work experience between trainers and employers seem to be another cause of the gap in their assessment of skills in structure, sewing, finishing and combined skills. When trainers were asked about their work experience in a factory, the majority reported having no work experience in a factory. This is a common pattern among TVET trainers, who mostly transit directly from education. Conversely, many current employers have long experience working on the production line, having climbed the ladder to become a supervisor and then a manager and finally having opened their own business. Some of them even serve as trainers themselves in their factories due to the high demand for sewing skills.

Related to the second point, yet another important reason for the divergence in grading seems to be the limited interaction between TVET colleges and factories. In the Ethiopian dual TVET system, training is conducted in both schools and factories, with trainees spending 3 days per week in a factory. The role of trainers in this cooperative training setup is very limited. Currently, their role is to seek enterprises for apprenticeship, prepare training plans and follow their implementation, among others. However, trainers do not take an active part in the execution of the cooperative training, which is solely administered by the factory supervisor. This lack of cooperation and dialogue reduces the efficiency and the spillover effects of the cooperative training to other TVET trainees who might indirectly benefit from trainers' exposure to current industry needs. Of the 30 TVET/TIDI trainers who responded to our questionnaire, only 28 per cent acknowledged having used the machines and equipment of factories and 18 per cent had provided consulting services to factories. During our fieldwork we defined a number of additional issues in relation to TVET–factory interaction, one of which is that factory managers are not willing to make their machines and equipment available for TVET training due to lack of insurance and the possibility of misuse. Of the managers who were interviewed, 54 per cent (7 out of 13) indicated that they had never cooperated with TVET institutes to hire new employees and only 23 per cent said they had accepted interns from TVET institutes.

Relationship between skills expectations and assessment behavior

Thus far, we have argued that the gaps in the assessment of workers' garment skills between TVET/TIDI trainers and factory managers are due to their respective work contexts and backgrounds as well as their limited interaction with each other. In this section, we present the analysis of how the assessment of workers' actual skills is related to the assessor's expectations for those skills expressed in the questionnaire. Our survey also included questions on expected levels of cognitive and noncognitive competencies, but here we focus on work-related skills because of their comparability with the results of the skills assessment. To this end, we first provide some descriptive evidence on the expectations for garment production skills between factory managers and TVET trainers.

The results, summarized in Table 6, indicate that TVET trainers have higher expectations because they believe that new workers possess the skills required to work in pattern making, structure, sewing and finishing. The mean scores given by the factory managers are lower for all the activities, meaning that the managers are critical of the garment skills possessed by new workers. Specifically, there are large gaps in expectations between TVET trainers and factory managers in sewing and structure, at 0.586 and 0.575 percentage points, respectively. One possible explanation for higher scores from the TVET trainers is that they spontaneously give high scores on most of the items because they are required by the curriculum to transmit all of those skills. On the other hand, factory managers tend to be critical of skills trained in places other than their own factory, including TVET institutes. Another important reason for the differences in scoring is that factory managers value noncognitive skills more highly than

Table 6: Descriptive statistics of questionnaire responses regarding skills expected for young workers in the garment industry

	Total		Factory manager		Trainer	
Variable	Mean	SD	Mean	SD	Mean	SD
Combined	4.026	0.557	3.744	0.785	4.148	0.379
Pattern	3.767	0.726	3.564	1.031	3.856	0.544
Structure	4.209	0.818	3.808	1.234	4.383	0.486
Sewing	4.140	0.560	3.731	0.665	4.317	0.404
Finishing	4.116	0.697	3.962	1.108	4.183	0.425

Source: Authors' computation.
SD = standard deviation.

Table 7: Effects of expectations on grading scores

	(1) Combined	(2) Pattern	(3) Structure	(4) Sewing	(5) Finishing
Expectation	0.384**	0.014	0.202**	0.674***	0.551*
	(0.181)	(0.206)	(0.100)	(0.140)	(0.133)
Worker control	Yes	Yes	Yes	Yes	Yes
Factory control	Yes	Yes	Yes	Yes	Yes
Constant	−1.848**	−0.897	−1.179***	−1.892***	−1.305**
	(0.730)	(0.735)	(0.444)	(0.600)	(0.569)
N	171	171	171	171	171
R^2	0.669	0.686	0.667	0.683	0.718

Note: All estimates control for years of experience, age, gender and education.
Source: Authors' computation.
Robust standard errors in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

TVET trainers do.[7] In fact, in addition to technical skills, factory managers appreciate skills such as punctuality, obedience and discipline, whereas TVET trainers value literacy and numeracy skills. It is worth noting, however, that the behavioral skills that employers value receive only 8.72 and 3.51 per cent of teaching time in the curriculum of TVET Levels 1 and 2, respectively (Addis Ababa City Administration TVET Agency, 2010).

Having discussed the difference in expected garment-related skills between factory managers and TVET trainers, we will now move on to discuss how these expectations interact with the assessors' evaluation of workers. Table 7 displays regression coefficients obtained by applying equation (1) to the questionnaire outcomes, replacing the variable for being a TVET or TIDI trainer in Table 5 with the expectation score variable. That is, while Table 5 shows trainer–employer gaps on the assessment of actual skills, Table 7 focuses on the interaction between assessors' expectations and the scores they give. The outcomes displayed in Table 5 correspond to the patterns shown in Table 7, with the coefficients statistically significant, except for those related to scores on pattern-making skills. The results indicate that a difference in skill expectations

[7] A detailed analysis of questions related to the perceived need for cognitive and noncognitive skills will be part of a forthcoming publication.

influences the scoring patterns of assessors in the areas of structure, sewing, finishing and the four domains combined. The lack of statistical significance in pattern making arises from the fact that even the trainers recognize the low demand for these skills in the labor market.

Conclusions

This paper set out to identify the areas of garment production in which TVET trainers' expectations and assessment of workers' skills differ from those of factory managers in Addis Ababa. A key strength of the present study was that we designed an assessment based on Ethiopian occupational standards for garment workers (Levels 1 and 2) and asked TVET trainers and factory managers to concurrently evaluate the skills of workers with 1–3 years of experience. We focused on skills in four domains of garment production: pattern making, knowledge of garment structure, ability to assemble fabric with a sewing machine and finishing of the garment. We used the same four domains in a survey of both factory managers and TVET trainers on the skills they expected garment workers to have. The combined data set allowed us to study gaps in both expectations and assessments of workers' performance between factory managers and TVET trainers. Our first set of results shows the existence of gaps in assessing workers' knowledge of garment structure, ability to assemble fabric with a sewing machine, finishing skills and combined performance. Pattern making was the only task for which the assessment pattern of TVET trainers matched that of employers. The lower competence of workers in pattern making seems to be one of the main reasons for the lack of a statistically significant difference in this domain. Another important factor is that pattern making is not a task frequently performed by less experienced workers in a factory.

We identified three main reasons for the gaps in assessment patterns between the supply and demand sides of the trained workforce. First, despite the fact that both TVET trainers (on the supply side) and factory managers (on the demand side) conduct some workforce training, the former at formal TVET institutions according to the national occupational standards and the latter in the factory, they have distinct priorities and modes of training, which affect their focus of assessment. Second, the education and work experience of the assessors themselves affect their grading behavior. Third, gaps occur due to limited interaction between the supply and demand sides. The new TVET curriculum in Ethiopia pledged to offer cooperative training as a bridge from classroom to factory for TVET trainees. At this moment, the implementation of cooperative training does not involve trainers very much, and collaboration between TVET institutes and factories is still limited. If well implemented, cooperative training, in addition to its benefits for trainees, would also allow trainers and employers to learn from each other and reduce perception gaps.

Our second set of findings contrasted the trainers' and managers' stated expectations for garment skills with their actual evaluations of workers. The results were obtained by matching the questionnaire for TVET trainers and factory managers with the results of the skills assessment. We found that the TVET trainers' expectations concerning garment production skills are statistically significantly different from those of the factory managers, in that the former have higher expectations and the latter are very critical. Interestingly, we found that these differences in expectation affect the evaluation of workers' skills by causing the two groups to use different evaluation criteria. Finally, we show that factory managers have a greater appreciation for behavioral skills in new workers, such as discipline, punctuality and obedience, than TVET trainers have. Moreover, the Ethiopian occupational standards emphasize these skills less than other skills, with the curriculum allocating less than 10 h for them at Levels 1 and 2, which correspond to the level of line operators in factories (Addis Ababa City Administration TVET Agency, 2010).

The evidence from this study suggests that the Ethiopian occupational standards should be updated to match the skills expected by employers, especially for TVET Levels 1 and 2. Reforms should also focus on defining a new tool for better assessing the

competence of TVET trainees. Finally, interventions for enhancing the partnership between training institutions and factories, including cooperative training, should be considered in order to increase the relevance of school-based TVET.

Acknowledgements

This research was enabled by a grant-in-aid from the Japan Society for the Promotion of Science for the project "Skills Formation of the Youths in Africa: Interdisciplinary Examination of the Linkage between the Training System and Employment in the Industries" (Project ID: 15H05142).

References

Addis Ababa City Administration TVET Agency. (2010), *Ethiopian TVET-System Model Curriculums Based on Ethiopian Occupational Standard (EOS)* (Addis Ababa, Ethiopia: Addis Ababa City Administration).

Addis Ababa City Administration TVET Agency. (2015), *Enrolment of Trainees 2005 E.C.* (Addis Ababa, Ethiopia: Addis Ababa City Administration).

Allen, J., Levels, M. and Andvan der Velden, R. (2013), 'Skill Mismatch and Skill Use in Developed Countries: Evidence from the PIAAC Study', ROA Research Memorandum 017 (Maastricht, Netherlands: Research Centre for Education and the Labour Market).

Andreasson, K. (2009), *Global Education 20/20: What Role for the Private Sector*? (London: Economist Intelligence Unit).

Arnhold, N., Kapil, N., Goldberg, I., Piatkowski, M. and Rutkowski, J. (2011), *Europe 2020 Poland: Fueling Growth and Competitiveness through Employment, Skills, and Innovation* (Washington, DC: World Bank).

Bauer, T. K. (2002), 'Educational mismatch and wages: a panel analysis', *Economics of Education Review*, **21**, 3, 221–9.

Burrus, J., Jackson, T., Xi, N. and Steinberg, J. (2013), 'Identifying the Most Important 21st Century Workforce Competencies: An Analysis of the Occupational Information Network (O*NET)', ETS Research Report Series No. 13–21 (Princeton, NJ: Educational Testing Service).

Central Statistical Agency of Ethiopia. (2013), *'National Statistics Abstract (2003–2014): Manufacturing'* (Addis Ababa: Central Statistical Agency). Available at http://www.csa.gov.et/index.php/2013-02-20-13-43-35/national-statistics-abstract/138-manufacturing (accessed 21 December 2017)

Central Statistical Agency of Ethiopia. (2014), *The 2014 Urban Employment Unemployment Survey: Statistical Bulletin* (Addis Ababa: Central Statistical Agency).

Chavan, R. B. (2013), *Ethiopian Textile Industry: Status and Growth Prospects* (Saarbrücken, Germany: Lambert Academic Publishing).

Close, S. (2012), *Skills for Solomon Islands: Opening New Opportunities* (Washington, DC: World Bank).

Cunningham, W. and Villaseñor, P. (2016), 'Employer voices, employer demands, and implications for public skills development policy connecting the labor and education sectors', *World Bank Research Observer*, **31**, 1, 102–34.

Edukans Foundation. (2009), *Technical Vocational Education and Training in Ethiopia Mapping* (Addis Ababa: Edukans Foundation).

Federal TVET Agency of Ethiopia. (2010), *Ethiopia TVET System [PowerPoint presentation]* (Addis Ababa: Federal TVET Agency).

Geiger, M. T. and Moller, L. C. (2015), *Fourth Ethiopia Economic Update: Overcoming Constraints in the Manufacturing Sector* (Washington, DC: World Bank Group).

Government of Ethiopia. (2005), *Education Sector Development Plan III* (Addis Ababa: Federal Democratic Republic of Ethiopia).

Government of Ethiopia (2010), *Education Sector Development Plan IV* (Addis Ababa: Federal Democratic Republic of Ethiopia).

Hailu, E. T. (2012), Analysing the labour outcomes of TVET in Ethiopia: implication of challenges and opportunities in productive self-employment of TVET graduates. Master's Thesis, Institute of Social Studies, the Netherlands.

Hanushek, E. A. (1979), 'Conceptual and empirical issues in the estimation of educational production functions', *Journal of Human Resources*, **14**, 3, 351–88.

Hartog, J. (2000), 'Over-education and earnings: where are we, where should we go?', *Economics of Education Review*, **19**, 2, 131–47.

Kleibrink, J. (2013), *Causal effects of educational mismatch in the labour market*. Ruhr Economic papers No. 421, Ruhr University, Bochum, Germany.
Krishnan, P. and Shaorshadze, I. (2013), *Technical and Vocational Education and Training in Ethiopia* (London: International Growth Center and London School of Economics and Political Science).
Martin, R., Villeneuve-Smith, F., Marshall, L. and McKenzie, E. (2008), *Employability Skills Examined: Shedding Light on the Views of Stakeholders and Employers* (London: Learning Skills Network).
McGoldrick, K. M. and Robst, J. (1996), 'Gender differences in overeducation: a test of the theory of differential overqualification', *American Economic Review*, **86**, 2, 280–4.
McKendrick, J. E. (1986), 'Managers talk about careers', *Management World*, **15**, 7, 18–9.
Moller, L. C. (2015), *Ethiopia's Great Run: The Growth Acceleration and How to Pace It* (Washington, DC: World Bank Group).
Mourshed, M., Farrell, D. and Barton, D. (2012), *Education to Employment: Designing a System That Works* (Washington, DC: McKinsey Center for Government).
Müge, A. M. and Andrews, D. (2015), *Skill mismatch and public policy in OECD Countries. OECD Economics Department Working paper No. 1210*, Organisation for Economic Co-operation and Development, Paris.
OECD. (2016), *PISA 2015 Assessment and Analytical Framework: Science, Reading, Mathematics and Financial Literacy* (Paris: OECD Publishing).
Ogier, T. (2009), *Skills to Compete: Post-Secondary Education and Business Sustainability in Latin America* (London: Economist Intelligence Unit).
Rabe-Hesketh, S. and Everitt, B. S. (2004), *A Handbook of Statistical Analyses Using Stata*, 3rd edn (Boca Raton, FL: Chapman & Hall/CRC).
Rabe-Hesketh, S. and Skrondal, A. (2012), *Multilevel and Longitudinal Modeling Using Stata*, Vol. 1, 3rd edn (College Station, TX: Stata Press).
Rao, N., Sun, J., Ng, M., Becher, Y., Lee, D., Ip, P. and Bacon-Shone, J. (2014), Report on Technical Support for the Validation, Finalization and Adoption of the East Asia-Pacific Early Child Development Scales (EAP-ECDS) (New York: UNICEF).
Robst, J. (2007), 'Education and job match: the relatedness of college major and work', *Economics of Education Review*, **26**, 4, 397–407.
Strand, S. (2014), 'School effects and ethnic, gender and socio-economic gaps in educational achievement at age 11', *Oxford Review of Education*, **40**, 2, 223–45. https://doi.org/10.1080/03054985.2014.891980.
Wolter, S. C. and Ryan, P. (2011), 'Apprenticeship', in E. A. Hanushek, S. J. Machin and L. Woessmann (eds), *Handbook of the Economics of Education* (Amsterdam: Elsevier), Vol. 3, pp. 521–76.
World Bank. (2011), *Strengthening Skills and Employability in Peru: Final Report* (Washington, DC: World Bank).
World Bank. (2014), *Botswana Labor Market Signals on Demand for Skills* (Washington, DC: World Bank).
World Bank Group. (2015), *Fourth Ethiopia Economic Update: Overcoming Constraints in the Manufacturing Sector* (Washington, DC: World Bank Group).
World Economic Forum. (2014), *Matching Skills and Labour Market Needs: Building Social Partnerships for Better Skills and Better Jobs* (Geneva: World Economic Forum).
Zemsky, R. (1997), 'Skills and the Economy: An Employer Context for Understanding the School-to-Work Transition', in A. M. Lesgold, M. J. Feuer and A. Black (eds), *Transitions in Work and Learning: Implications for Assessment* (Washington, DC: National Academy Press), pp. 34–61.