Modern Apprenticeships:
Widening Their Scope, Sustaining Their Quality

Proceedings of the Seventh Research Conference of the
International Network for Innovative Apprenticeships

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Introduction to the Proceedings

Robert I. Lerman

Board Member, International Network for Innovative Apprenticeship, Urban Institute, and American Institute for Innovative Apprenticeship

The theme for the 7th Annual Research Conference of the International Network for Innovative Apprenticeship (INAP), *Modern Apprenticeships: Widening Their Scope, Sustaining Their Quality*, captures an important set of issues facing researchers and policymakers throughout the world. How can countries retain the strength of traditional elements of apprenticeship, widen the occupational range of apprenticeships, and insure that the skills learned through apprenticeships are of sufficiently high quality to improve productivity and to assure that workers adapt to changing technologies and industry structures? This volume provides papers that are summary versions of the presentations partly aimed at answering this question.

The Washington, DC venue for the October 2-3, 2017 conference was appropriate, given the keen and growing interest among federal and state policymakers in building a robust U.S. apprenticeship system. These policymakers are looking for productive ways to raise the share of workers in well-paid and rewarding careers and strengthen the middle class. Currently, the penetration of apprenticeship as a share of the U.S. labour force is strikingly low relative to the apprenticeship shares in other advanced countries, not only with respect to Germany and Switzerland but also compared to Australia, Canada and England. However, beginning in 2015, the U.S. and state governments under the leadership of two Presidents, key figures in the U.S. Congress, and Governors have been increasing funding for apprenticeship and attempting to expand apprenticeships into occupations beyond the traditional fields of commercial and industrial construction. This volume of proceedings address several of the issues facing any country attempting to widen the scope of apprenticeships while maintaining quality.

Nearly all the topics relate to the challenges for apprenticeship systems around the world. For example, examining the costs and benefits of apprenticeships and understanding how best to engage employers are important in any effort to insure apprenticeships achieve and sustain scale. Building and updating occupational standards and assessment approaches are critical steps in maintaining the reputation of apprenticeship systems for quality to workers and employers. Making sure skill standards and assessment are rigorous and transparent can yield occupational and organizational identity. How apprenticeships and universities can complement each other’s approach to developing knowledge and skills is another important topic.

Finally, the papers and conference discussions dealt with the diversity of apprenticeship trends across countries. The cross-country variations reflect not only the scope and structure of systems on the ground, but also how employers, workers, educators and policymakers understand apprenticeship. From this perspective, the creation of INAP and its biannual conferences help fill serious gaps in knowledge about a cross national patterns of a form of skill development. Authors from 16 countries participated in this seventh INAP research conference and will return to their countries with a recognition of the challenges and the lessons for enhancing their own apprenticeship systems.

I am grateful to my colleagues at the Urban Institute, particularly Ezinwanne Okoli, and the other board members of INAP for helping with the organization of the conference. Special thanks go to the Siemens Foundation for providing a grant to assist in paying for the expenses of the project and the preparation of this conference volume.
The American Institute for Innovative Apprenticeship also contributed to the success of the conference. International exchanges are often worthwhile but they are especially valuable in the apprenticeship field. We at INAP are proud to contribute to the international understanding of how quality apprenticeships can enhance the lives of workers, the growth of national economies, and the sustainability of good jobs and rewarding careers.
Keynote
Collaboration between Companies and Schools in the German Dual Apprenticeship System

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Summary: On the macro level (federal level) and exo level (state or regional level), the German Dual Apprenticeship System shows a high degree of institutionalised collaboration. However, the companies and vocational schools on the meso level (institutional level and level of the actors), in contrast, are just loosely coupled with a dominant partner (i.e., companies) and a subordinate partner (i.e., schools). The term ‘Dual System’ was invented in the 1960s, and the intention was to emphasise equal responsibilities, partnership of equals, lively encounters and close collaboration between companies and schools. This vision is not yet a reality, as the presented empirical survey demonstrates. A majority of companies do not or rather seldom cooperate with ‘their’ vocational schools. The term ‘Parallel Systems’ seems to be more appropriate to characterise the actual situation on the meso level than the term Dual System.1

Keywords: Apprenticeship, dual system, survey, lack of collaboration

Problem Statement

The term ‘Dual System’ was first used in 1964 in a report published by the German Committee on Education System. The term Dual System should emphasise that it is a “system of simultaneous training in companies and vocational schools” (German Committee on Education System 1966, p. 418), whereby the success of the dual training system depends on whether the responsible bodies “interact” (ibid., p. 503). Dual and the interaction of the learning locations characterise the original concept.

The word ‘simultaneous’ must not hide the fact that the company (then as it is today) is the dominant partner in the ‘system’. This is expressed by the fact that (1) the company (and not the vocational school) decides who receives a training place and training contract (followed by a place in the vocational school) and who does not, (2) the apprentices spend 2/3 of their time in the company and only one third of their time in the vocational school, (3) the training is only deemed successful if the final examination organised by the chambers (who represent the companies and therefore the learning location company) has been passed.

The German Committee on Education System recommended already in 1964 a reform, which is formulated as the model for the future: “In dual training, the company and the vocational school have a joint responsibility. Their contribution is different, but it constitutes equal obligations and rights. In order to reinforce and make the common ground for responsibility visible, both partners organize a joint examination upon the conclusion of the vocational training at the end of the obligatory vocation schooling period.

1 The paper is based on Gessler, M. 2017a.
and issue the final certificate together” (German Committee on Education System 1966, p. 493). And later: "In the Dual System, the vocational schools are equal partners of the companies. Both serve the same goal, albeit with different orders and under their own responsibility." (ibid., 500). The key words of the description of the Dual System are: shared responsibility, balanced obligations and rights as well as equal partnership.

This concept of the 1960s is still used today to characterize the Dual System by means of the duality of the learning locations and/or the division of practice in companies and theory in schools. These approaches does not take into account that the training (1) often takes places at three or more locations of learning (e.g. inter-company training institutions, training in another company in the context of a training alliance or training network) and that (2) with the introduction of the didactic principle of ‘Learning Areas’ in the vocational schools in 1996, the separation between theory and practice was abolished (Gessler 2017b). Today's concept of the term Dual System is more complex and, depending on the conceptualization, comprises five (BMBF 2013) or six "core principles" (Dehnbostel/Lindemann 2016), six "criteria" (Gonon 2014) or even eleven "essential elements" (Euler 2013).

The principle of duality of the two learning locations – company and school – forms nevertheless the birth and the core of the Dual System, despite the necessary complementary differentiation. We ask therefore, what is in this core?

Reference Level

The Dual System can be investigated, first, under the perspective of immediate and mediate collaboration, and, second, on different levels.

On a macro-level, the immediate collaboration related to the process to develop federal training regulations for the companies on the one side and the process to develop framework curricula for the schools on the other side could be questioned. Another focus on this level would be the mediate collaboration between the four stakeholder groups (federal government, state governments, federal employers’ association and federal employees’ association) within the joint committee, the Main Committee of the Federal Institute for Vocational Education and Training (BIBB).

On an exo-level, the immediate collaboration related to the process to control the executing institutions (companies and vocational schools) would be a focal point, especially the work of the chambers on the one side and the work of the education authorities on the other side. On this level the mediate collaboration between the three stakeholders groups (state government, local employers’ association and local employees’ association) within the state committee for vocational education and training could be another topic.

On the meso-level, the immediate collaboration between the executing institutions (companies and vocational schools) and their actors (trainers and teachers) would be central. On this level, there also exist a joint committee to facilitate, promote and foster mediate collaboration, the committee of the competent authority with three stakeholder groups (representatives of local employers’ association, representatives of the local employees’ association, and representatives of the schools, normally the principals of the vocational schools). Another possible unit of investigation could be the examination boards, where, besides the VET experts for the employers’ and employees’ sides, at least one teacher be present.

On the micro-level, the level of the apprentices/students, the main question would be how these actors integrate the input they get from the two separate institutions into their
individual knowledge base, how they connect the different experiences and how they form a professional identity within and across the different locations.

With regard to the design and the success of the learning processes at the micro-level, the levels interact on the one hand, and on the other hand, the intensity of the effect on the learning process decreases with increasing distance from the micro-level. The macro-level has the least influence on the learning process and learning performance, although this creates necessary conditions to promote collaboration on the exo- and meso-levels.

The focus of this study is the immediate collaboration between the actors of the companies (trainers) and schools (teachers) who organize and implement the teaching processes. The investigation is thus located on the meso-level.

The concept collaboration

Collaboration can be considered from three perspectives. On a societal level, the concept is embedded in a historical process with a principle of quasi-natural social specialisation and differentiation of work, the division of labour, and the mutual need of collaboration as a consequence of the restrictions of individual resources. On an organizational level, collaboration is embedded in a principle of efficiency with the purpose of optimization of joint activities to improve performance and products. Our approach investigates collaboration on the action level with the focus on the actors and social processes. Actions are embedded in evolved formal structures, which must be subjectively redefined and re-contextualized in everyday practice. The societal and the organizational level are also relevant contexts for this re-contextualisation. Our concept of ‘collaboration’ is based on and inspired by works from scholars in cultural-historical activity theory (Fichtner 1984; Engeström 1987; Wehner et al. 1998; Wehner et al. 2000).

Actions are embedded in evolved formal structures. Actions are not ‘free in space’. The pre-configuration of collaboration between teachers and trainers, we call ‘initial coordinatedness’ (Wehner et al. 1998) or ‘implicit collaboration’, was formed in a complex historical process (see sections one and two of this article). The history, tradition and framework set by law and regulations at the macro-level and the exo-level are not determining directly the actions, but they create a shared means and overlapping tasks between teachers and trainers. In the initial status of coordinatedness, companies and schools can participate and contribute to the dual system without direct collaboration. Activities are executed without communication and without orientation to the concrete partner. The activities are nevertheless roughly integrated through the common framework on the macro- and meso-levels, and are nevertheless related through the historical process.

This ‘initial coordinatedness’ forms a rough joint context and orientation for teachers and trainers, and must be redefined and re-contextualised in the face of contingent, unexpected events in daily practice. Explicit coordinative activities arise. We distinguish between ‘corrective coordination’, driven by unexpected events, and ‘expansive coordination’, based on the anticipation of unintended events. The corrective coordination is problem-driven and past-oriented, while the expansive coordination is goal-driven and future-oriented. On the surface of the observable actions, these two orientations cannot be distinguished, but they become visible if the underlying motivation, goal-orientation and time line are analysed. Experience is a necessary pre-condition for the expansive coordination. We therefore expect that the expansive coordination started once as a corrective coordination. The problem-driven and past-oriented corrective coordination is therefore more than just the situative solution or a single action. It is a valuable resource for expansive coordination. Examples for coordinative actions are the
exchange of information between teacher and trainer on the social behaviour, professional performance, and the engagement and discipline of the apprentice. Other examples are visits of teachers in companies to improve their understanding of the work and situation in the company (exploration of the companies), clarification of organisational issues (e.g., examination date) or the offer of an open consultation day for trainers in the schools. These consultation days are normally done with the idea of improving coordination. Shared expectations and intentions with divided responsibilities on the basis of the given traditional initial coordinatedness are the common characteristics of corrective and expansive coordination. Expansive coordination can lay the groundwork for cooperation. Examples for such cooperative activities are cross-institutional learning projects, joint events in the school or in the company, the coordination, tuning and matching of company training plan and school curriculum and joint development of training and teaching materials. Shared objectives with a high degree of interdependence on the basis of the given traditional initial coordinatedness are the common characteristics of cooperation.

The last form of collaboration is ‘co-construction’. We expect that this form can either emergent bottom-up if the partners in the phase of cooperation reflect their role and the initial coordinatedness due to unsatisfactory cooperative practice as a result of the basic division of labour and the incorporated division of responsibility. The orientation towards a common goal could trigger revision of the given roles. As a result, the partners now act towards a common goal within a unified institution. Examples for this form of collaboration are joint and institutionalised working groups/task forces, further joint training, the involvement of trainers in the schools, and internships of teachers and teacher students at the company. The boundaries between school and companies lose their relevance. Another option for the establishment of this type of collaboration could be a top-down approach through legislative regulations. This intervention is, in our opinion, problematic, as this type of collaboration not only needs institutions/structures, it also needs a common mindset. Top-down approaches should therefore be accompanied by intensive coaching support.

Based on this theoretical approach, we can now clarify our research question: How do experts for in-company training in companies (such as trainers, instructors, HRM) evaluate the immediate explicit collaboration (captured as coordination, cooperation and co-construction) between teachers and trainers, and what measures do they consider important to intensify immediate explicit collaboration between the two learning locations and their actors?

Survey

First, items were collected on the basis of the studies already carried out (Pätzold et al. 1993; Berger/Walden 1995; Walden/Brandes 1995; Walden 1999; Ebbinghaus 2009). A further source was the recommendation of the Main Committee of the Federal Institute for Vocational Education and Training (1997). In the next step, the items were categorised on the basis of the three groups of collaboration: coordination, cooperation and co-construction. The structured items were than discussed with three instructors from companies of differing sizes (<50, 50–250, >250). The structure was confirmed and some items were adjusted. Finally, a test for intelligibility was carried out with six instructors. Misleading statements were revised and discussed again with the instructors until all items were deemed understandable. The internal consistence (Cronbachs α) is acceptable (coordination with nine items=.77) and good (cooperation with six items = .82, and co-construction with nine items = .89).
The investigation was carried out in the city state of Bremen (one of the 16 states in Germany). Even though the results cannot be representative of Germany because of the regional limitations, the data is suitable for establishing tendencies: (1) In a city state the distances are short. This favours collaboration, which should lead to somewhat better values when compared to larger states. (2) According to a study conducted by the GEI German Economic Institute (Institut der Deutschen Wirtschaft), Bremen is ranked number one in the federal rankings in the performance indicator ‘apprenticeship rates’ (GEI 2016). This placement makes clear that the companies in Bremen have a high level of engagement in vocational training. This is an aspect that favours collaboration, which is why it can be assumed that the results are better compared to other federal states.

The survey took place online and anonymously in the first half of 2017 using the platform, Questback. All companies offering dual apprenticeships in Bremen in the industrial sector (N = 2,131) were invited in writing to participate in the survey by the Bremen Chamber of Commerce - CCI for Bremen and Bremerhaven.

The sample size should have at least 326 responses (population: 2,131, sampling error: 5%, confidence interval: 95%, distribution: 50%). 389 companies contributed to the survey. The limit was reached (sampling error: 4.49%).

We asked the companies which collaborative measures already existed (scale: 1 = exists completely, 2 = exists rather frequently, 3 = exists rather seldom, 4 = does not exist). To identify the lack of explicit collaboration, we grouped the measures into the three categories ‘coordination’, ‘cooperation’ and ‘co-construction’ and analysed the answers (‘exists rather seldom’ and ‘does not exist’) group by group (company size). The results are presented in Table 1.

<table>
<thead>
<tr>
<th>Company Size (employees) *</th>
<th>1 – 49</th>
<th>50 – 249</th>
<th>&gt; 250</th>
<th>All **</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordination</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack (total)</td>
<td>76.5 %</td>
<td>71.1 %</td>
<td>71.4 %</td>
<td>74.2 %</td>
</tr>
<tr>
<td>Does not exist</td>
<td>39.8 %</td>
<td>36.8 %</td>
<td>29.3 %</td>
<td>37.6 %</td>
</tr>
<tr>
<td>Exists rather seldom</td>
<td>36.7 %</td>
<td>34.3 %</td>
<td>42.1 %</td>
<td>36.6 %</td>
</tr>
<tr>
<td>Cooperation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack (total)</td>
<td>93.1 %</td>
<td>91.9 %</td>
<td>94.6 %</td>
<td>93.1 %</td>
</tr>
<tr>
<td>Does not exist</td>
<td>63.8 %</td>
<td>59.7 %</td>
<td>67.7 %</td>
<td>63.1 %</td>
</tr>
<tr>
<td>Exists rather seldom</td>
<td>29.3 %</td>
<td>32.2 %</td>
<td>26.9 %</td>
<td>29.9 %</td>
</tr>
<tr>
<td>Co-construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack (total)</td>
<td>94.4 %</td>
<td>95.7 %</td>
<td>94.4 %</td>
<td>94.8 %</td>
</tr>
<tr>
<td>Does not exist</td>
<td>74.5 %</td>
<td>81.0 %</td>
<td>71.5 %</td>
<td>76.3 %</td>
</tr>
<tr>
<td>Exists rather seldom</td>
<td>19.9 %</td>
<td>14.7 %</td>
<td>22.9 %</td>
<td>18.5 %</td>
</tr>
</tbody>
</table>

* percentage based on valid data per category
** percentage based on valid data in the sample

Table 1: Lack of Collaboration

The lack of explicit collaboration is high (all: 74.2%, 93%, 94.8%). The two learning locations (companies and vocational schools) are mostly operating within the given political framework without an orientation to face contingent and unexpected events in the daily practice together (coordination), to improve together the quality of the system (cooperation) or to implement together innovative practices based on a reformed division of labour (co-construction).

Conclusions
A low degree of regulation and standardisation on the meso-level creates, to put it positively, a space for flexibility, lively encounters based on interest and personal motivation, and correspond to the basic principles of training and education, such as individuality, situatedness, authentic interaction and expertise. Nevertheless, we cannot ignore the fact that the potential of collaboration between the actors (e.g., trainers and teachers) has not been exhausted, and the collaboration has not improved significantly in the last 20 years. The two meso-level systems—companies and schools—are mostly differentiated and separated. Some trainers and teachers are crossing the boundaries between the two worlds, but all students must cross those boundaries weekly—another asymmetry within the system.

Some authors and think tanks articulate the view that the problem of collaboration on the meso-level in Germany is a logical consequence of the division and coordination on the macro- and exo-levels (federal and state governments). The proposed solution—according to this logic of inheritance of qualities—is the centralisation and unification of power on the macro- and exo-levels. The Swiss Dual Apprenticeship System sets a positive example, so these authors, and should serve as a role model for Germany (Bertelsmann Stiftung 2009). The Swiss Dual Apprenticeship System is on the macro- and exo-levels centrally governed. That may be right, but, current studies show that the problem of collaboration between companies and schools is not solved in the Swiss System either (Sappa/Aprea 2014; Peter 2014).

Two perspectives should be clearly distinguished: the perspective of decision-making (structures and government) and the perspective of personal conceptions, interest, motivation, behaviour and immediate collaboration (processes and activities). The two perspectives are two sides of one coin, nevertheless, the logic of determination is in our view an inadequate frame and mindset. Collaboration between companies and schools and joint educational processes can be appreciated, promoted, supported, and valued but not prescribed. Intensive collaboration on the meso-level is even possible without such a framework. Collaboration on the meso-level is then a necessary activity for the implementation, reproduction and continuity of the system. Collaboration on the meso-level can stabilise a fragile system (Gessler 2017b), but established robust structures on the macro- and exo-level do not produce immediate collaboration on the meso-level.

Intensive collaboration on the meso-level can be created only on the meso-level itself and on a daily basis. This collaboration can and should be nevertheless supported by activities on the macro- and exo-level, not because these activities determine collaboration and solve the problem of collaboration between companies and schools, but because these activities can create the awareness, appreciation and opportunity for collaborative activities on the meso-level. But, there has been, at least in the last ten years, no engagement, no support and also no interest to intensify the collaboration between teachers and trainers, companies and schools. The orientation towards the measurement of output or outcome was more important than the orientation towards the development and improvement of the input and the processes.

**Literature**


Topic 1:
Cost and Benefits of Apprenticeships
Summary: In 2016, an evaluation of costs, benefits and quality of in-company training offered in South African companies was conducted by a team of researchers under supervision of Bremen University upon initiative and in close cooperation with the South African Sector Education and Training Authority merSETA. Based on aggregated data provided by 142 companies a comprehensive analysis including calculations according to different company sizes was made. Among the most interesting results is the fact that smaller or medium sized companies seem to have some advantages in comparison to much bigger firms. This advantage refers to the cost-benefit side of training offers but also to some of the quality aspects analysed.

Keywords: Cost-benefit study, apprenticeship quality, SMEs, South Africa

Introduction

In order to develop its full potential as a contributing factor for economic growth vocational education and training and its core element, namely in-company training has to be both, cost-effective and of high quality. Because economic efficiency is always one of the major driving forces behind entrepreneurial decisions, company managers need to know about a precise cost-benefit calculation of training provided within their own company. The lack of accurate information and transparency was one of the main arguments to set up CBQ (CBQ= costs, benefits, quality of in-company training) as an online measurement instrument in South Africa based on self-estimation (Hauschildt & Brown, 2011). This paper summarises some major findings with a special focus on the performance of SMEs. It address the problem in two ways: a) quality and b) cost benefit ratios obtained but then links the two parts of the examination.

Method and Research Design

The project design was based on three interrelated questionnaires. Besides a detailed interrogation on all aspects regarding cost and benefits, a questionnaire based on several 10-point scales, exploring quality criteria of in-company training was introduced. All in all, data collection within the project in question consisted of 202 individual company cases, 142 of which were valid for a comprehensive data analysis. Company cases where data entry was incomplete (46 cases) or where data could not yet be validated (14 cases) did not enter into the analysis.

Quality criteria assessed using the CBQ methodology are divided into four input and two output criteria (for more details and explanations see Rauner 2007 and 2010), which are documented in the following table.

Table 1: Quality criteria of in-company training as measured with CBQ
Quality criteria examined by CBQ | Context of quality criteria (what do they refer to)
---|---
1. Reflective work experience | Input factor
2. Professional level of training | Shaped though the working and learning environment in a company or at the training provider
3. Autonomous/independent learning | Output factor
4. Learning in business processes | Aim and result of vocational education and training
5. Vocational commitment | 
6. Professional competence/fitness for the particular occupation („Berufsfähigkeit“) | 

As a matter of fact, training quality also depends on further (input) aspects, such as the quality of training staff (qualification of, number of), presence and quality of a training schedule, technical standards of equipment/degree of modernity (equipment) or the intensity of cooperation between different learning venues (company — school or company-company, if different companies cooperate) to name a few. But such items were not considered in this study due to the nature of the interrogation that was entirely based on a self-evaluation provided by company representatives: responsible managers or training officers filled in the questionnaires, i.e. persons who cannot or should not judge on matters where a more independent overview would be indispensable.

**Costs and benefits**

Of training on have been measured on the basis of data that could very precisely be provided by the persons interrogated. Both, costs and also benefits as analysed in this study refer to the period of training provided within a company (i.e. recruitment costs or long term benefits that occur after a training period were not taken into the account). For a detailed description of the composition of costs factors analysed with CBQ see Rauner, 2014, and Hauschildt, 2016, 12-28.

The training benefit is generated by the productive work of the apprentices. This benefit is assumed to be equal to the wages that the company would have to pay to skilled workers if it did not employ apprentices. In the present study, all tasks an apprentice has to carry out were calculated according to a skilled worker’s pay times an apprentice’s productivity. The questionnaire of the CBQ calculation tool thus contained a very detailed interrogation on learners remunerations, wages of fully skilled workers in the apprenticed occupation, times of learning and working, training times of full-time or part-time training officers, times spend in external training seminars or schools, average illness and vacation times etc. (for more information in this context, see Rauner, 2014, 25-37).

**Results**

A central result of the study is the fact that without any subsidies, only very few companies manage to offer in-company training in a cost-effective manner or achieve an equilibrium between costs and benefits. Less than 10% of all companies examined were in a position where no support was needed in order to obtain net training benefits. Very generally speaking, this was more likely in training courses with a longer duration due to the fact that the productivity of learners in their 3rd and 4th year of training is at a more
advanced level so as to allow for greater benefits in times where training allowances are still much lower than skilled workers' wages.

As for the biggest cost factors, one has to name training allowances of learners and wages of a training staff, which – in sum – counted for about 80% of the total costs of training. The remaining 20% consisted of costs dedicated to teaching & learning material, fees for exams, professional clothing, external training, seminars and travel, write downs for machinery, assets and maintenance or rents to name to most relevant ones.

Whatever the reasons were for costs exceeding the benefits in a single company case, the overarching analysis provided in the full report on the study (Hauschildt 2016) delivers some explanations. Very often, high costs were due to the involvement of (expensive) full-time trainers or training procedures that took place far away from the business, i.e. value added processes. In some cases training allowances of learners were very high and almost reached skilled workers wage levels so that benefits were difficult to obtain. Smaller companies who do not employ full-time trainers and do not have the means to run separate workshops for their apprentices are operating at much lower costs (see figure 1).

Figure 1: CBQ South Africa: Cost – benefit calculation comparison between companies employing full-time training personnel and companies engaging part-time trainers only

However, the lack of additional training personnel or the absence of training workshops does not mean that smaller or medium sized companies have a deficit nor that training in such companies has to be offered at lower quality. Very much on the contrary the experiences made in the South African CBQ project suggest that the circumstances of training in a smaller environment seem to offer some advantages compared to training offered by larger firms or global players.

Figure 2 shows an overall result of the CBQ quality analysis according to different criteria assessed. For some of the criteria addressed, the dispersion of results was much higher than for others, for example the criterion “vocational identity” has been estimated as excellent or good in a considerable number of cases, whereas the two criteria “independent or autonomous learning” and “learning in the business process only
reached medium values. With regard to the output criterion “fitness for occupation” the results were more equally distributed among the marks A “excellent” and D “to be improved” compared to other criteria assessed in the project.

When analysing the different quality criteria according to company sizes, it struck that smaller companies not only managed to keep pace with larger providers but also often performed better. Notably the criteria of “independent or autonomous learning” and the “professional level of training” were better met in companies of smaller or medium size. Vocational commitment of learners was good or excellent in almost 50% of all cases. 38% of the companies reached satisfactory levels and but 15% of the assessments turned out rather problematic. As for this criterion, there was not so much of a difference according to the size of the companies. But with regard to the criterion of business process orientation, this was again the case. Here, a number of bigger companies have shown more deficits than SMEs (Hauschildt 2016, 31-37).

When linking the results of the analysis of costs and benefits of training to the results of the quality analysis according to company sizes (Figure 3a and b), the picture is equally interesting and supports the finding that training offers in SMEs have a great potential: The cost-benefit ratio of in-company training provision in larger firms was more often negative in companies with 500 employees or more, while a considerable proportion of those companies who only had 0-9 or 10-49 employees was generating net benefits. All in all, quality was not yet adequate in the majority of company cases assessed, but a higher proportion of SMEs reached good or adequate levels. It can be followed that – due to the specific circumstances of training offered in smaller or medium sized companies (learners receive more responsible tasks, are more likely to obtain a better overview on a company’s work processes, manage to faster identify themselves with their occupation, etc) – SMEs do have a comparative advantage, that some of them already exploited to very good extents. But because - on the other hand – company owners/managers/or decision makers in these enterprises are often not yet aware of these advantages, it would be very essential to promote apprenticeship training in such companies and provide consultancy services (see Bantwini & Mungoni, 2015) that lead to better insights.
Literature


Hauschildt, U., 2016, CBQ Project Report. Summary and conclusion of data analysis based on company cases analysed using the online measurement instrument “Cost-Benefit-Quality (CBQ)”. Bremen, IBB.

IBB/merSETA, 2014, CBQ Manual I. Guidelines for the application of the online-measurement instrument „Costs-Benefits-Quality (CBQ) of in-company training. Manual elaborated within the project „Implementing modern VET tools in South Africa: CBQ, COMET and VIC“. Bremen, IBB & Johannesburg, merSETA.


Investment in Apprenticeship – a Matter of Calculation or of Culture? Considerations from the point of view of individuals, enterprises, society

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Summary: Austria is a country with a long tradition and professional practice in apprenticeship and Vocational Education and Training (VET). After twenty years, a scientific survey gives new insight into the motivation and incentives concerning costs and benefits for apprenticeship VET in Austrian companies, also in comparison with German and Swiss conditions. As a follow-up to the Austrian contribution to this topic in 2015 this article addresses issues of motivation and interest of companies and enterprises, in a quantitative, financial way as well as in a qualitative sense. A core these out of the three methodology research approaches is that costs and calculation are essential elements for awareness and willingness of enterprises for apprenticeship VET, but that is not sufficient. It needs tradition and spirit to take over responsibility for apprenticeship education, training and qualification of Youth.

Keywords: Apprenticeship, Calculation, Costs, Culture, Investment, Motivation

Introduction

During twenty years in Austria (AT) no comprehensive scientific study concerning the topic of cost and benefit of apprenticeship was available (see: Lassnigg/Steiner 1997), in contrast to Germany (DE) and Switzerland (CH), in these countries the topic of economic issues concerning education and training – especially apprenticeship – was an ongoing theme for scientific research and evaluation all over the last twenty years (e.g. Wolter et.al. 2012 ff.).

This aspect could evoke the question: is the economic factor in apprenticeship in Austria not such relevant as in other countries are running apprenticeship programmes like DE and CH? Are aspects of costs and benefits not a prior theme in dual Vocational and Educational Training (VET) programmes in AT? Are there additional, ore other, reasons relevant for dual VET education in Austria? What are possible similarities and differences between AT, DE, CH in interest and motivation for apprenticeship education? Which experience and expertise from AT could be interesting for countries with different systems, traditions and concepts of VET work based programmes? There exist no single and simple answers to these questions. But, there is an increasing interest on it, by different reasons.

Reasons for increasing interest in costs and benefits of apprenticeship in Austria

First reason for increasing interest on the topic costs and benefits in AT is the continuous decrease of numbers of apprenticeships during the last years. Second reason is the political effort for initiatives to promote apprenticeship education, because apprenticeship training is for the government the cheapest pathway in secondary VET, much cheaper
than VET in school, and much cheaper more than other services of public financed VET for those who cannot find an apprenticeship place in companies (Dornmayr/Nowak 2016, Bruneforth 2012). On the other hand apprenticeship VET contributes effectively to youth employment and is an essential factor of the relatively good situation of AT concerning the rates of Early School Leaving and NEET in AT. Public investment in apprenticeship by government by that reasons can work as a leverage for improvement of qualification, employment and social welfare. But, it is necessary to know, what are the main motivations and incentives, why companies invest in apprentice VET, and what could stimulate the willingness to start or to increase with apprentice VET in enterprises.

Development of apprenticeship numbers in last four decades in AT

The following descriptions of Methodology and explanations of results should be seen against the background of quantitative developments in the last decades. Although the numbers of apprentices in absolute numbers decreased in the last four decades from 122,940 in 1975 to 86,047 in 2015 – with a peak of 132,640 in 1980 – in relation to the population of the age group the share of apprentices differed not more than +/- 2% during these decades. In long-term-comparison the share of apprentices in 2015 is even higher than in 1975. This in sum steady interest to invest in apprenticeship VET seems to be in the long run less influenced by economic ups and downs.

![Figure1: Numbers of apprentices and youth in age of 15 in Austria 1975 – 2015](source)

This quantitative relation is the background for a qualitative thesis: quantitative calculation of costs and benefits of apprenticeship VET is a necessary aspect to explain willingness and activity of companies, but it is not a sufficient explanation. There are more and deeper influence factors that are important for apprenticeship investments of companies.

First research results about that were presented at INAP Symposium 2015 (Marterer/Härtel 2015). Initiated by that, and by other incentives of AT government, research in AT is going on and is described in short in the following chapters.

Methodology

To investigate the current situation concerning costs and benefits of apprenticeship VET in AT three approaches were chosen. The first approach is to interpret the outcomes of the recent survey to costs and benefits of apprenticeship VET in AT (Schlögl/Mayerl 2016) This survey is the first scientific report regarding this topic in twenty years, and
contains comparisons with recent international research. The main focus of the survey, based on representative information out of companies, both active and non-active in apprenticeship VET, is to give serious information background and argumentation for policy measures to support and promote apprenticeship VET in companies. The second approach of research are own studies by the authors, by order of Chamber of Economy Styria and Federation of Industry Styria concerning conditions and qualification needs for apprentices from the point of view of companies, also with the aspect of motivation and interest of companies to invest in apprenticeship VET, including the question for alternative approaches for qualification and employment. The third research approach is a practical approach. Long-term cooperation of the authors in their project activities with eight leading industry companies who offer high performance apprenticeship VET are background of very practical experience and insight in thinking and acting of companies and their responsible staff for apprenticeship VET and human resources strategies. These very confidential cooperation could not be published in every detail concerning each company, but allows a practice-based estimation and verification of theoretical approaches and theses concerning costs and benefits of apprenticeship VET in companies.

Results

Based on the methodological approaches mentioned above some essential recognitions and results are the following:

Survey cost and benefits: In average net costs for apprenticeship in AT are higher than in DE and CH. Within the three most important motivation factors for investment in apprenticeship “tradition” and “responsibility for profession, for youth, for society” are ranked. Three of the five most important factors for motivation and argumentation for apprenticeship VET are not based on quantitative calculation, but on more qualitative, especially long-term rationale.

Results of own studies of the authors: decision for education of apprentices in own companies is mainly motivated by attracting young persons to qualify them for profession and own company. If there are no qualified applicants are available, most of the companies do not substitute them by other employees.

Practical cooperation with worldwide leading companies during five years show the enormous interest of companies to come in contact with young people to attract them for education and training in apprentice VET in their companies. Enterprises are not only willing to invest in apprentice VET, they invest in measures and events to come in contact with youth, students, schools, with parents, to show them options and perspectives for pathways to qualification and professionalization in professions.

A common conclusion from the AT perspective is, that the calculated relation between costs and benefits in apprenticeship VET is important, but not enough.

Apprenticeship VET is mainly based on a culture: a culture to take over responsibility not only in the economic sense for the own company, but also for the profession, for youth and youth employment, in some cases also for society. This culture is based on longstanding tradition from the early middle-age in the 12th century in central Europe countries. All activities that try to transfer these VET programme must consider this background, and transfer not only the programme of apprenticeship VET, but also the cultural thinking behind.

Background of willingness and activity for apprentice VET in companies is as well tradition, youth and social responsibility, awareness of long-term effects, without possibility to calculate them in detail, but convincing it is valuable, more than that: it is indispensable.

Literature
Dornmayr, H. / Winkler, B.: 2016, Survey among apprenticeship graduates in Austria two years after completing of training. IBW Vienna April 2016.
The Benefits and Costs of Apprenticeship: A Business Perspective

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Summary: This paper presents an initial study of the benefits and costs faced by firms with apprenticeship programs. Recent policy focus on skill development and worker training has not been matched by a detailed understanding of the business case for apprenticeship. Based on conversations, site visits, and data collection with 13 organizations, we created a detailed set of major decision points and a roadmap to help firms understand how to measure benefits, cost, and return on investment. In addition, we performed detailed analysis of data from two firms, finding internal rates of return of at least 40 percent for both firms.

Keywords: apprenticeship, benefits, costs

Introduction

Some studies have estimated the benefits of apprenticeships to American workers or society, but there is very little research on how apprenticeships benefit American businesses. In 2016, we conducted a study to better understand the employer costs and benefits of a diverse set of Registered Apprenticeship programs across the manufacturing, health care, retail trade, and information technology (IT) sectors.

Based on interviews and site visits, we completed 13 profiles of organizations actively involved in administering successful apprenticeship programs and two quantitative case studies that examine the relative benefits of apprenticeships versus other staffing and training options. We profiled firms, consortia, an educational institution, and others. Together, the profiles and case studies led us to identify for firms a series of critical decision points that bear significantly on the costs incurred and benefits reaped from their apprenticeship programs. We also provide guidelines for how companies—whether they are considering an apprenticeship program, just starting one, or with one well underway—should measure the costs and benefits of their program.

Our report presents our findings from this study and consists of four parts:

1. Overview of apprenticeships
2. Major decision points (for implementing or administering apprenticeships)
3. Roadmap to measurement
4. Case studies

Methodology

The goal of our study was to better understand why firms choose apprenticeship as a training strategy and what makes apprenticeship successful from an employer
perspective. We studied organizations across a variety of industries, occupations, regions, and firm sizes. Our aim was to have a diverse study group rather than one fully representative of all firms and intermediaries that have considered or started apprenticeship programs. Even with our small sample, we identified similar themes and challenges across the various organizations which motivated the results presented here.

At the time of our study, the 13 firms and intermediaries were continuing to support apprenticeship programs, indicating that they perceived net benefits from participating these programs. The qualitative evidence of how firms benefit from these programs is plentiful.

For our study, we were interested in quantitatively measuring firms’ costs and benefits to calculate a return on investment (ROI) of apprenticeship. We primarily interviewed senior human resources managers and production managers to determine how firms came to the decision to start and continue apprenticeship programs. From these discussions, we learned that most firms do not compile the comprehensive cost and benefit data required to analyze the ROI of their apprenticeship program. Most firms could easily provide cost information, such as the cost of hiring workers off the street versus apprentices or the cost of training and educating one apprentice. However, few of the firms were able to provide data on the benefits they identified from their apprenticeship programs.

While costs are relatively straightforward to measure, measuring the benefits of an apprenticeship program can be challenging. One barrier to doing so is that key benefit data is typically derived from companies’ production metrics rather than directly observed. To calculate an ROI, the benefits data then needs to be combined with costs data, which often resides in firms’ human resources or payroll systems or departments. On their own, firms did not collectively analyze those data sets to examine how hiring and training workers relate back to the workers’ productivity. The few firms with solid benefits data did weigh the data against program costs, and one even went as far as calculating a measure of the firm’s ROI for apprentices versus other hires. Such complete analysis, however, was not the norm.

Following our initial information gathering, we visited several firms based on the prospect that those companies had sufficient data for calculating an ROI and their expressed willingness to share the data. From these visits, we were able to conduct detailed ROI analysis for two firms.

**Results**

In our study, common themes emerged around firms’ experiences with apprenticeship. Regardless of the firms’ industries or the occupations of their apprentices, firms faced the same decisions when beginning and administering apprenticeship programs. They also had the same questions and faced similar challenges with measuring the ROI, particularly related to measuring the benefits, associated with their programs. Their collective experience led us to develop a list of major decision points for firms when developing or continuing an apprenticeship program as well as a roadmap to measurement to help firms with collecting and interpreting data on their program’s costs and benefits.
In addition, we conducted detailed analysis of firm-level data provided by two firms, Dartmouth-Hitchcock Medical Center and Siemens USA. We found that the Dartmouth-Hitchcock medical assistant apprenticeship program nearly paid for itself within the first year and had an internal rate of return of at least 40 percent. For Siemens USA, the rate of return was at least 50 percent compared to hiring workers off the street. Siemens started their program in part because they were having difficulty finding workers with the skills the firm required. The ROI we calculated has the potential to increase substantially if the firm continues to face this difficulty and is left with apprenticeship as the only option for bringing on skilled workers.

**Major Decision Points**

Dartmouth-Hitchcock, Siemens, and the other firms in our study all started apprenticeship programs by making similar decisions and tweaking their decisions when needed to keep their programs successful and relevant. Whether a firm is just beginning a program or is looking to re-evaluate their current program, firms should consider the following seven questions to determine how to align their apprenticeship program with their goals.

1. Is apprenticeship integrated with your production and other strategic priorities?
2. Where does apprenticeship fit in your overall talent development strategy?
3. What value can partnerships provide?
4. How should you develop and deliver the classroom curriculum?
5. What are the best ways to implement on-the-job training and incorporate apprentices into the workplace?
6. How do you decide between a competency-based and a time-based apprenticeship program?
7. How many apprentices do you need?

As noted earlier, these questions are not one-time decisions. For one, firms we spoke with noted that they didn’t always make the right decision the first time around and that their current apprenticeship program was more successful because of corrected mistakes they made the first, or even second, time around. These decisions ultimately impact the costs and benefits of an apprenticeship program. While it might seem attractive to a firm to provide classroom instruction on-site or to administer their program in-house, these decisions come with costs and for some firms, prohibitive costs. The roadmap to measurement helps firms identify the costs and benefits associated with apprenticeship so that they can structure an effective and cost-effective program.

**Roadmap for Measurement**

To best measure the ROI of an apprenticeship program, firms should collect data even before implementing their program. Evaluating success is much easier if firms collect data as early as possible. Regardless of when data collection begins, firms should keep in mind clear alternative scenarios, or “counterfactuals,” to evaluate how apprenticeship compares to other ways of building a skilled workforce (such as hiring off the street, using temporary or contract workers, or paying existing staff overtime, as well as various training models).

The following steps will help any firm measure the return to investing in apprenticeship and make use of what they learn along the way. Although they may seem obvious, few firms had actually thought about their apprenticeship programs in this way. The six steps towards better measurement are:
1. Identify and count all costs for apprenticeships—and all other hires.
2. Think broadly about the benefits of apprenticeships today and tomorrow—productivity, flexibility, quality, turnover, employee satisfaction, etc.
3. Look across the company for data to measure those benefits. Begin collecting data early and often.
4. Keep in mind organizational changes other than the introduction of an apprenticeship program, as well as external factors, that may affect performance.
5. Share the data analysis across the company.
6. Make changes based on the analysis.
Topic 2:
Governance: Including Stakeholders Roles and Responsibilities
Mixed-ownership: A New Experiment to Encourage Enterprise Effectively Participate in Vocational Education

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Summary: Based on a 2016 field investigation and case study, it is clear that in China, many vocational schools/colleges have been exploring mixed ownership and have formed many typical models and useful experiences. This paper will examine three dimensions of the mixed-ownership vocational schools/colleges: the status, the successful experiences, and the challenges. There are mostly five models of the mix-ownership vocational schools/colleges at present in China. The legal, the property rights and the benefits allocation are the three key challenges faced by the mix-ownership vocational schools/colleges.

Keywords: mix-ownership vocational schools/colleges, status, successful experiences, challenges

Introduction

In 2014, China has promulgated a "decision on accelerating the development of modern vocational education" and proposed to "explore and develop the joint-stock and mixed ownership in vocational schools/colleges, allowing participating in school running with capital, knowledge, technology and management and enjoying the corresponding rights", which is the first time the official documents of China put forward the concept of "mixed ownership" in the field of education. Under the impulses and influences of national policies, many vocational schools/colleges all over the country have been exploring mixed ownership, and have formed many typical models and useful experiences. The paper seeks to research the status, the successful experiences and the challenges of the mixed ownership in vocational schools/colleges on the base of one national investigation in 2016, which may bring a new change to the school-based vocational system.

Methodology

This research mainly adopts the method of field investigation and case study. Between September 2016 and November 2016, we visited many vocational schools/colleges and enterprises in different provinces of china, such as Liaoning Province, Zhejiang Province, Sichuan Province, Beijing city, Tianjin City and so forth, and obtained some important first-hand information through field supervision and in-depth interviews. Subsequently, we launched one nationwide case collection activity about the mixed-ownership vocational schools/colleges from October 2016 to December 2016, and a large number of practice cases were collected. Finally, through the field investigation, case collection, literature collection and other methods, we obtained 103 practice cases in total.

Results

Since the "decision on accelerating the development of modern vocational education" proposed to explore and develop the joint-stock and mixed ownership in vocational schools/colleges, many vocational schools/colleges of China have been exploring mixed
ownership combining with their realities, and have formed many successful models and useful experiences. Yet simultaneously, they also face many uncertain factors and challenges under the constraints of the certain legal institutions and mechanisms within China. In the research, the findings are follows:

The status and features of the mixed-ownership vocational schools/colleges
In this survey, we have obtained 103 cases from 96 vocational schools/colleges, 5 of which are multi-case colleges. Viewing from the attribute of the sample schools/colleges, 87 schools/colleges belong to the public vocational schools/colleges, accounting for 90.6% of the cases, and 9 schools/colleges are private vocational schools/colleges, accounting for 9.4% of the cases. This shows that the current subject of the mixed-ownership vocational schools/colleges in China is the public vocational schools/colleges. Meanwhile, the research shows that the mixed-ownership vocational schools/colleges’ school-enterprise cooperation levels are manifold (Figure 1) and mainly carry out at the second-class colleges level at present in China.

On the whole, the mixed-ownership vocational schools/colleges present the following features. The first is the multiple property rights structure. The mixed-ownership vocational schools/colleges are a mutually mixed property rights structure, which consists of state capital, collective capital and non-public capital (Que, M., 2015). Compared with the public or private vocational schools/colleges, the most essential characteristic of them is the mixing of property rights. The second is the modernization of governance. Being a product of mixed property rights requires their governance capability and governance system must be modernization. It emphasizes pluralism rather than single subject management; pays attention to democracy, participation and interactive management; and objectively forms a modern corporate governance structure. The third is the marketization of operational mechanism. Absorbing non-governmental sectors, the mixed-ownership vocational schools/colleges can overcome the administrative management and truly become the main-body of running a school/college, which makes it possible for vocational schools/colleges to allocate resources in accordance with market mechanisms.

The model of the mix-ownership vocational schools/colleges
The research shows that there are five models of mix-ownership vocational schools/colleges at present in China.

- The model of public vocational schools/colleges absorbing social capitals:
  This model refers to public vocational schools/colleges that initiatively absorb various forms of social capital and achieve multiple levels cooperation in mixed ownership.
The model of private vocational schools/colleges absorbing state capitals: This model refers to private vocational schools/colleges that absorb state capitals to jointly invest and build the mixed-ownership vocational schools/colleges by virtue of their own advantages and ways (Tong W., 2016).

The entrusted management model lies between public and private vocational schools/colleges. This model refers to private vocational schools/colleges with a high quality of education and good social reputation that can implement trust management in the public vocational schools/colleges, which are inefficient, weak and lack of vitality. Similarly, the public vocational colleges can also trust management of the private vocational colleges.

The model of establishing mix-ownership vocational school/college through utilizing different capitals. This model refers to different capitals, such as state capital, collective capital, private capital and so on, that take different combinations and cooperation forms to establish one new mix-ownership vocational school/college (Gao W., 2015).

The model of public-private partnership: This model refers to when the local government absorbs private capital or joins the private vocational schools/colleges to establish one new mix-ownership vocational school/college or to participate in the construction of the campus infrastructure.

The governance mechanism of the mix-ownership vocational schools/colleges
In the practice domain, many vocational schools/colleges which try out implementing the mixed ownership effectively draw on the rational core of the modern corporation system, and also establish a shareholders conference, a board of directors (council), a board of supervisors and other governance institutions. Meanwhile, most mix-ownership vocational school/colleges implement the system of principal responsibility under the leader of the board of directors and form one modern governance system in which the decision-making power, executive power and supervisory authority are bound by checks and balances.

The challenges of mix-ownership vocational schools/colleges
The existing studies show that legal constraints, property rights and benefit allocations are the three key challenges faced by the mix-ownership vocational schools/colleges.
At the legal level, the main challenge revolves around the lack and conflict of relevant laws. At present, the “Education Law”, “Vocational Education Law” and other relevant legal provisions of China haven’t established specific rules concerning the mix-ownership vocational schools/colleges, which leads to some key problems that cannot be clarified at present. In addition to the obvious lack of relevant laws, some existing legal provisions are not compatible with the mix-ownership vocational schools/colleges’ development requirements. At the property rights level, it highlights the unclear property rights of schools and the difficulty of educational property rights’ circulation. The property rights in the vocational schools/colleges are difficult to assess because of their complex property rights types and structures. The other challenge is that the development of China’s education market has not matured and the educational market access rules, competition rules, trading rules and exit mechanisms are still imperfect, all of which directly affect the freedom of capital access to the vocational schools/colleges and increase the difficulties of capital integration. At the benefit allocations level, the challenge mainly embodies that as China emphasizes the public welfare and nonprofit nature of education, it’s difficult for the individual or enterprises to get reasonable remuneration from the mix-ownership vocational schools/colleges at present.
In addition to all of the challenges listed above, the problem of the readjustments to the vocational schools/colleges’ previous governance structure, preventing the loss of state-owned assets as well as the market access rules of social capital investing in vocational
education are all practical problems that the mix-ownership vocational schools/colleges cannot avoid in the short run.

**Literature**

Que, M.K. Pan, Q. & Zhu J. 2015: On dilemma and strategy of developing the mix-ownership vocational schools/colleges, China vocational and technical education, 18, 28-32.

Tong, W.J. & Ren Z.Y. 2016: The countermeasure and realization form of developing the mix-ownership vocational schools/colleges, Higher engineering education research, 5, 183-188.

On the Fringe Or In The Fold: Issues of Policy, Governance and Recognition Of Artisanal Workers in the Economy

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Summary: Nearly two-thirds (1.8 billion workers) of the global working population are informally employed. The elusive world of work of the informal economy, also defined as the non-observed economy, includes many of the occupational roles and activities known in the formal economy, but the informal context of these activities often escapes the reach of education, training and skills development initiatives. In South Africa, as in most developing countries and specifically in Sub-Saharan Africa, informality as a way of living and working has steadily increased, yet national policies generally appear to be designed for the formal economy, workplaces and learning. The aim of this paper is to highlight the need for a dedicated effort to reposition skills development policies to embrace informal economy workers, in particular the artisanal workers. This calls for radical transformation to generate projects, focused on economic, ecological and social sustainability to enhance the skills of artisanal workers in the informal economy.

Keywords: informal economy, policy repositioning, artisanal workers, radical transformation

Introduction

“There is another economy out there. Like those floating soap bubbles, its edges are diffused and it disappears the moment you try to catch it. It is based on small sales and tiny increments of profit, yet it produces, cumulatively, a huge amount of wealth. It is massive yet disparaged, open yet feared, microscopic yet global. You can call it System D...” Robert Neuwirth (2012)

Neuwirth explains System D’s French connection with the word “débrouillard”, meaning resourceful and ingenious, noting specifically the reference to a system or a network of activities enmeshed into informal economies. Ironically, characteristics such resourcefulness and ingenuity are highly sought after in the formal economy, yet they manifest generously, often in survival mode, in an informal world of work; a world of work not fully recognised by policy makers and often hard to access from a governance perspective. It is also a world of work where artisanal workers are active, but invariably on the fringe of training and support initiatives, yet statistically the informal worker numbers are high. Navigating these numbers towards a shared vision for the future, beyond the statistical count, will require co-creation “to organise tomorrow, today”, in the words of Jay Naidoo (2017).

Informal economy statistics

In 2012, the Organisation of Economic Co-operation and Development (OECD) reported that nearly two-thirds of the world’s workers (1.8 billion) were economically engaged in the informal economy. Informal work is not only the norm in low and middle income
countries, but also sizeable in high income economies. Medina, Jonelis & Cangul (2017), reported that in Sub-Saharan Africa (SSA) the informal economy contributed 38 percent of the Gross Domestic Product (GDP) between 2010 and 2014, with Latin America, South Asia and Europe respectively at 40, 34 and 23 percent of the GDP. In SSA, in South Africa, Mauritius and Namibia the informal economy contributions ranged between 20 and 25 percent, whereas in Benin, Tanzania and Nigeria it could be as high as between 50 and 65 percent.

One of the contributing factors to informal economies in Africa is internal and cross-border migrations, spawned by conflicts, political and economic crises and environmental factors. These migrations lead to sprawling urbanisation, which impact harshly on the spatial composition of major cities. In the BRICS Cities: Facts and Analysis Report (South African Cities Network, 2017), spatial analysis of cities in the BRICS association (Brazil, Russia, India, China and South Africa) were explored in relation to slums and informal settlements as a result of urbanisation. The report revealed that in South African nearly one-fifth of the population in major cities are living in informality. In provinces with rural and deep rural geographies the informal economy is also prevalent.

Figure 1: Provincial map of South Africa

The introduction provides a brief overview and a statistical picture of the informal economy, which is steadily growing and may grow even more in future. At the 2017 World Economic Forum on Africa, one of the themes that emerged was “persistent jobless growth”, which confronts most developing countries and could lead to further unemployment and people gravitating towards the informal economy. The youth, aged 15-24 years, not in employment, education or training (NEET) is of particular concern, considering that in the first quarter of 2017, this group formed 32,4 percent of the unemployed statistics (Stats SA, QLFS, Q1 2017).

Methods and research design

There are various definitions for the informal economy and informal employment, inclusive of the definition of the International Labour Organization (ILO), 1993:

“The informal sector is broadly characterised as consisting of units engaged in the production of goods or services with the primary objective of generating employment and
incomes to the persons concerned. These units typically operate at a low level of organisation, with little or no division between labour and capital as factors of production and on a small scale - labour relations, where they exist, are based mostly on casual employment, kinship or personal and social relations rather than contractual arrangements with formal guarantees.”

Considering the elusiveness of the notion of the informal economy, the initial research method was case study-based to systematically gather data and explore understandings towards a comprehensive study in the critical paradigm. The case study method is valuable when the researcher has little control over events, yet is in a position to develop a rich, chronological description of the contexts and characteristics of situations (Cohen, Manion & Morrison, 2000).

One of the case studies focused on 120 members of 30 co-operatives in primarily rural and deep rural communities in four provinces in South Africa. These provinces included the Eastern Cape, Kwazulu-Natal, Mpumalanga and Limpopo, shown in the map in Figure 1. Although the 30 co-operatives were formally registered, all except one in the Eastern Cape operated at a low level of organisation and intermittent small scale production, mostly at the level of subsistence. The intermittent production could be ascribed to a lack of tools, machinery and equipment or where the equipment was available, limited or no maintenance skills were developed to keep it sufficiently operational. In some cases the correct use of equipment was also noted as problematic. As a result, the quality of products and the ability to sustain production was severely hampered, to the point where it discontinued in some cases.

In several of the co-operatives in Kwazulu-Natal, welding skills were required. It was observed that in some cases products were fabricated through trial and error, resulting in substandard end products. These observations were specifically prevalent in deep rural areas in the province in the districts of Vryheid and Dundee. Noting also that the co-operatives could only be reached by dirt roads and the nearest towns were not accessible in certain weather conditions.

Similar observations were documented in other geographical areas, where tool and equipment improvisation was a common characteristic. In some cases where tools and equipment or basic facilities were available, the facilities could only be accessed on a rotational basis. Basic artisanal skills sets were mostly acquired through need and could be termed as self-taught or through observation of artisanal workers performing certain tasks. Overall, training facilities such as public Technical Vocational Education and Training (TVET) were either not in the immediate vicinity of the co-operatives or co-operative members could not afford extended times away from their subsistence operations. They nevertheless expressed a hunger for knowledge and skills to improve the quality of their work and their standard of living.

**Results**

The results corresponded with a similar study of informal workers in the construction sector in South Africa (Hammond, Bowen & Cattell, 2016). In both studies the outcome was that existing training facilities and the emphasis on training towards full or part occupational or artisanal qualifications could not resolve the training needs of artisanal workers in the informal economy. The most suitable training would be discrete skill set training and recognition, preferably facilitated in situ at the sites where these workers already operated. In situ training implies that these sites must be recognised as workplaces, which in the current education and training policy context, often due to a
narrow interpretation of the policies and related regulations, exclude rather than embrace workplaces that are not fully compliant with the range of criteria suitable for regular formal businesses and work-integrated learning.

The South African Skills Development Amendment Act, Act No 37 of 2008, states that the Act provides an institutional framework to devise and implement national, sector and workplace strategies to develop and improve the skills of the South African workforce. Considering that the informal economy contribution to the GDP is already about 20 to 25 percent, this sector of the workforce and the related workplaces are as much part of the economy as their formal business counterparts. It will, however, require a dedicated effort to reposition policies and regulations to fulfil the radical transformative intent of the original conceptualisation of the cluster of education, training and skills development legislation. It will also require communities to engage with project developers on a case-by-case basis to ensure that training is fit-for-purpose and contributing to the socio-economic and ecological sustainability of people in far flung corners of the country, as well as in informal settlements.

Literature

Liebenberg, A. (2016): A merSETA project report of a technical training support intervention for 120 members of 30 co-operative. Johannesburg: merSETA.
StatsSA 2017, Quarterly Labour Force Survey Quarter 1, 2017 Pretoria: StatsSA.
Topic 3: Apprenticeships and Universities: Substitutes or Complements
VET and universities in the German context- substitutes or complements ? – A problem analysis

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Summary: While the German dual system seems to lose attractiveness among school leavers and the so-called "transition system" has emerged as a new constitutive institutional sector in the VET system besides the dual system and full-time VET, academic pathways are now becoming more relevant and tertiarisation and academic drift seem to put the VET under strain. However, "academisation" and "vocationalisation" happen in various ways, either as an adaptation of the apprenticeship system in higher education, which may be called "tertiary vocational education" or "dual study programs", or as academic trends within the VET system itself.

Keywords: dual system, apprenticeships, dual study programs, academisation

Introduction

Germany’s dual system, which stands for the objective to impart labour market relevant competences to a large share of the school-leaving population, has often been criticised for its "conservatism". However, an examination of the general social and economic benefits of the apprenticeship system in comparison to other countries (Harris/Deissinger 2003) and of its contemporary international reputation underlines the problematic character of such statements from authors critical of the system.

For VET researchers, the question currently arises as to whether the assessment that it has long been considered a “mass apprenticeship system based on the strong occupational identity of those holding the corresponding qualifications” (Ryan 2003, 150), is still valid. The problem of an emerging ‘battle for apprentices’ has entered the current public agenda in Germany. This topic appears to be particularly associated with the challenges emanating from tendencies towards tertiarisation within the German educational system (Deissinger 2016). Hence, criticism has moved away from an ‘internal’ perspective and towards the question of whether the dual system – and with it non-academic pathways into employment – still finds its deserved social acceptance beside higher education. The new view is rather an ‘external’ one, looking at the various sub-systems of the German education system and their links to each other.

Academisation has been happening in Germany since the mid-1960s (Jacob/Solga 2015). Still it becomes visible in the general education system, e.g. with the concept of the "Gemeinschaftsschule" (a kind of comprehensive school merging lower and intermediate secondary schools) where objectives such as permeability (Durchlässigkeit) and non-selection are the underlying pedagogical and, more to the point, political motives. The federal state of Baden-Württemberg’s abolition of the "Grundschulempfehlung", which rules which school a child should proceed to after primary education, provides further proof that education policy is hanging on to the belief that higher education is naturally a more rewarding and socially preferable pathway for young people (Neugebauer 2010). Besides, and this will be the major focus of this paper, academisation is taking place in the VET system itself, and is now also spreading to higher education—in particular with the emerging "dual study programs" or "dual
universities”, which some authors characterize as a form of "tertiary vocational education" (Hippach-Schneider 2016).

The German VET policy context
The importance of the dual system as an integration pathway is still quite high in Germany, although we now can observe a more socially conditioned selectivity paired with changes in individual educational behaviour which is likely to have a long-term impact on skill formation institutions, and therefore also the established apprenticeship system (Jacob/Solga 2015).

Traditionally, the dual system is quite comprehensive as it stretches across the whole range of occupational fields, including banking, insurance and logistics as typical commercial occupations as well as the craft sector and technical profiles, such as "industrial mechanic". Although a number of service occupations now belong to the system of "skilled recognised occupations" (Deissinger 1996), most qualifications are rooted in the industrial of handicraft sector—a feature which reflects the interest and commitment of manufacturing companies in this kind of skill formation system. Moreover, one of the key characteristics of the dual system certainly lies in its corporatist foundations which make it a "collective skill formation system" (Busemeyer/Schlicht-Schmälzle 2014).

Against this background, the dual system appears as a setting for vocational training, where private (the companies), semi-private (the chambers and the trade unions) and public interests and responsibilities (the government), share responsibilities due to established patterns of cooperation (Deissinger/Gonon 2016). The chambers especially are supposed to help secure that vocational training is clearly “occupation-led” and not “company-based” in the first place. The contribution of the “competent authorities” is based on the principle of self-government. Since they are in charge of holding examinations for journeymen, skilled industrial workers, commercial clerks and master craftsmen or master industrial workers, as well as for in-company trainers, they obviously are expected to shield occupational standards. One aspect of continuity in the dual system's architecture is the fact that it still represents, besides its now more relevant legal basis and the role of the part-time vocational school, principles of the ancient guild system. Against this background, there is still "long-standing and highly regulated participation of business/industry in training" in the initial training sector, which some authors describe as "an outstanding feature of the German system" (Noah/Eckstein 1988, 62).

Structural relationships between Vocationalisation and Academisation
The recent shift towards academisation is the reverse side of the still significant role of the dual system in the overall German educational context. Between 2000 and 2013, the number of new entrances into the dual system decreased by 15%, whilst the number of those who accessed tertiary institutions increased by 59%. Meanwhile, fewer young people find themselves in non-academic vocational apprenticeships (outside full-time vocational schools or the transition system) than in tertiary institutions. The share of people in the 30-to-35 age group with a higher education entrance qualification now stands at 43%, in comparison to 22% among the 60-to-65 year olds (Autorengruppe Bildungsberichterstattung 2014, 7). In light of increasing, though sometimes regionally diverging numbers of high-school graduates, the gap might still widen in the future in favour of the academic sector. Because of this increasing academization, high potential
apprenticeship starters who hold a full or partial higher education entrance qualification and who would normally enter dual training as a credible alternative to higher education, could be diverted from a segment within the apprenticeship system which has for quite a long time been attractive both for employers and for school leavers. Nevertheless, an impressive share (27.7%) of beginners of apprenticeship training who held a formal qualification in 2015 allowing them to go on to universities or universities of applied science, is contesting this thesis. 73% of new apprentices in banking (Bankkaufmann/frau) come from the upper floor of general or vocational education (BiBB 2017, 142ff.). These features are quite unique for Germany, even if compared with Switzerland or Austria.

There is a number of facets illustrating academisation in the German VET system. The first one is clearly the number of young people who could go to university but choose a training occupation instead. The second one is the fact that vocational full-time schools (outside the dual system) contribute to the number of school-leavers that could potentially become students at universities (e.g. by attending a course at the commercial high school). In addition to what is happening in the school system and/or in the VET system, "vocationalisation" can be observed in higher education (Deissinger 2016). One of the most interesting institutional developments in recent years is the growth of "dual study programs" or "dual universities" (Duale Hochschulen). They clearly represent a kind of "tertiary vocational education" by partly copying principles of the dual apprenticeship system (Deissinger 2000).

Courses at what were formerly called "vocational academies" (Berufsakademien) have the character of "premium apprenticeships" because they involve companies in a similar way as the dual system. Their modern name is "Dual Universities" since they place themselves aside universities and universities of applied science as a peculiar model of higher education. Graduates are typically highly regarded and therefore sought after by employers. Students attain a high level of academic and practical achievement and the educational setting involves the interlocking of study and work periods in a much more structured way than in the non-academic dual system. Also, programs seem to be flexible and innovative and more specialized than at universities. Generally, dual study programs are perceived as "counteracting" the increase in traditional forms of academisation in Germany as they undoubtedly "have been successful so far in attracting high-achieving Abitur holders from the secondary school system" (Jacob/Solga 2015, 168).

Conclusion
It seems that academisation and tertiarisation do not have only one underlying cause. Environmental conditions in the social system certainly influence this development, above all through the "meritocratic principle" determining the choice of education by an ever larger number of parents. On the other hand, there are certainly factors which operate within the VET system itself that have to be looked at to understand specific features of academisation in Germany which seem to distinguish this country from other societies facing similar problems and developments.

Also, academisation and tertiarisation are as such more complex and multi-faceted, especially from the point of view of the VET system with the dual system as its core institutional setting. Structural and didactical similarities and convergences between the two large educational subsystems (higher and vocational education) indicate that "vocationalisation" is not fading but emerging in a new coating. The German example therefore shows that academic studies and vocational orientation need not to be conflicting principles since they can be aligned within the context of one common "philosophy". That this philosophy is supported by German employers and accepted and,
more importantly, demanded by school-leavers, underlines the strength of tradition in the field of VET in a nation-specific way. It points to a kind of complementarity between vocational and higher education. Whether substitutional effects will disrupt these positive developments in the forthcoming years remains an open issue. Therefore, empirical research on both employers’ preferences and school leavers’ perspectives are needed.

Literature


Deissinger, Th./Gonon, Ph. (2016). Stakeholders in the German and Swiss vocational educational and training system: Their role in innovating apprenticeships against the background of academisation, in: Education and Training, Vol. 58, No. 6, pp. 568-577.


Pastoral care within a college setting: customising individual apprenticeship support towards lifting participation and completion rates

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Keywords: pastoral care, mentoring, intensity of support, apprenticeship completion

Introduction

This paper reports analysis and discussion on the role of mentoring and pastoral care as mechanisms in lifting apprenticeship participation and completion rates within the Australian framework of apprenticeship training. Australian apprenticeship completion rates have reached historically low levels, with over 47.6% of apprentices leaving their training before completing (NCVER, 2015). As a result, training colleges are customising their support arrangements with the purpose of engaging, supporting and retaining their apprenticeship enrolments. Non-completions have fiscal and social impacts (Lamb & Huo, 2017). It is argued that these impacts can be mitigated through giving apprentices access to mentoring that is inside the trade work but outside their employment relationship. This research study looks at one of Australia’s largest training college providers, with a cohort of over 3600 apprentice enrolments (2017) in varying trades. It examines a variety of interventions employed to lift apprenticeship retention numbers, but most specifically, the use of mentoring.

It is envisaged that all apprentices need assistance to negotiate difficulties, build resilience, and learn from issues and complications that arise at some time during the course of their apprenticeship. It is suggested that Trade school is connected to the general work practices of the trade and yet trade school and the trade teachers are also separate from and provide a buffer space for the apprentice from their particular workplace. It is argued that this buffer means that teachers are slightly removed from the particulars of workplace relations but are well placed to gain insight about the generalities that are aggregated from hearing the experiences of a wide range and number of students. This separation from the employment relationship along with a more general commitment to their trade has the potential for the teachers to provide advice and some forms of pastoral care to the apprentices in their trade classes. Especially if this advice and assistance might support an apprentice to navigate difficulties but stay in the trade.

In this paper, some 180 cases are examined and reported on. Important findings from the research show that 87% of students were able to negotiate a significant hurdle with the assistance of individualized pastoral care arrangements. Key areas of interest to the research are: the barriers faced by apprentices; the types and intensity of support they require; the changing role of apprenticeship training colleges; and the contribution of increased pastoral care in the lifting of completion rates.
Methodology

The research question that focuses the study is ‘in what ways can training colleges customise apprenticeship support and pastoral care in order to lift their student completion rates?’

This inquiry has focused on a single TAFE provider, Holmesglen Institute, and the six-month pilot program conducted by their recently established Apprenticeship Support Centre (ASC). During this time over 180 apprentices from a variety of trades engaged the support centre for help in negotiating hurdles encountered in their apprenticeship progression. The findings from these interactions within these case notes were analysed and thematically coded for correlations. The research found that the barriers of apprentices were wide ranging and complex, and typical of the problems identified in the literature of current research (Bednarz, 2014; Buchanan, Rafaelle, Glozier, & Kanangaratnam, 2016; Karmel & Fieger, 2012; Dickie, McDonald and Pedic, 2011; Cully and Curtain, 2001). Students required help from the ASC officers in the following areas. Mentoring: Advice on career and skills development, as well as advice on their employer/apprentice relationship. Academic skills support. Help in accessing internal support systems in the areas of language, literacy and numeracy. Financial assistance: students were made aware of and guided in, accessing the financial assistance available to them, as well as their rights towards fee payment by their employer. Pastoral care: assistance in this area encapsulated a broad range of services and advice in areas such as harassment and discrimination, issues with health and with homelessness, employer impeded attendance to scheduled training, as well as navigating the complex system and of government frameworks for apprenticeship training.

Results

In reviewing the literature and available research it was identified that apprentices find the apprenticeship system as complex and difficult to access (CLMR, 2007; Commonwealth of Australia, 2011; Snell & Hart, 2008). The kinds of support offered can be seen by apprentices as institutional and removed from the day to day workplace or training classroom. The traditional role of employer as a mentor or pastoral carer is not always an ideal fit (Buchanan, Rafaelle, Glozier, & Kanangaratnam, 2016), with employers not always informed in areas of support available (Bednarz, 2014), or skilled in being able to deal with apprenticeship training (Victorian Auditor-General, 2014). Quite often the employers themselves are under resourced, especially in small businesses (Bednarz, 2014). Arguably, the role of the ASC officer as a singular contact point would also bring benefits to the employer as well as the apprentice.

The same can be said for the apprentice TAFE trainer who, like the employer, are often absorbed in the increasingly complicated requirements linked to their role. Other areas of support services such as those offered through the Australian Apprenticeship Support Networks can be fragmented and challenging for apprentices to access, with Australian Apprenticeship Centres not always best placed to provide the levels and intensity of support required (Buchanan, Rafaelle, Glozier, & Kanangaratnam, 2016). Field officers are another area of recent support provision. However, their numbers are few, their locations are removed, and they are in-essence a representative for the shared interests contained within the tripartite relationship between the employer, the trainer, as well as the apprentice. The difference provided through the role of the ASC
officer is representative of an individual services and support worker, accessibly located on campus, with a vocational background often matching the apprentices own trade. Many of the interventions identified within this study showed a coordination of services offered both internally and externally to the Holmesglen institution, while others required the kind of pastoral care and mentoring best negotiated through an ongoing individual relationship between the apprentice and the ASC officer. The data collected from this study shows that the vocational background of the ASC officers, their location within the TAFE training institute, and their ability to coordinate the multifaceted support arrangements available to apprentices, as a new answer to apprenticeship retention solutions.

There were also benefits provided through the assistance by ASC officers in placing 'out of contract' apprentices into new arrangements. Evidence within the case studies showed that in times of economic hardship employers can reduce costs by reducing employee numbers, and that the ASC officer was able to use the resources of the institute as well as their own industry contacts to draw on and place apprentices into new contract arrangements.

The primary findings indicate that apprentices require ongoing support across a broad spectrum of challenges within their apprenticeship pathway to completion. Many of these have been identified in the research of others. Unique to this study is the condensing of support into a single role at the point of contact for apprenticeship training – an ASC officer at their TAFE college. The vocational background of the ASC officer was important in identifying and coordinating the complexity of support on offer, as well as influential in establishing a relationship of mentor to the apprentice. It is posited in this paper that there is a current problem with the 'architecture' of VET training in Australia, in that all stakeholders find the system hard to access and difficult to navigate. It is hoped that this research will engage discussion on how best to deliver change towards a more student-centred model of VET delivery, with a dual goal of contributing towards achieving higher apprenticeship completion rates.

**Literature**


Teaching practices among college-based teachers of apprentices

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Summary

This paper provides a glimpse into current teaching practices among teachers working with traditional trade apprentices ('trade teachers') at Australian public and private providers of vocational education and training (VET), which are known as Registered Training Organisations (RTOs). The research is drawn from a major national study funded by the Australian Research Council, designed to examine the effects of different levels of vocational teachers’ qualifications upon the quality of VET teaching. For this paper, data from trade teachers, in different industry areas, was drawn out from a major survey of VET teachers/trainers, which included questions about their teaching approaches, as well as from focus groups of trade teachers.

Keywords: Trade teachers, apprentice learning

Introduction

Australian and international literature on apprenticeships recognises well the ‘dual’ nature of most apprenticeship systems: i.e. the fact that learning of apprentices generally takes place both in workplaces and in college/school settings (Smith, 2010). But the tendency in the literature is however, particularly in Australia, to focus on the learning that takes place in the workplace (e.g. Billett, 2015). There are exceptions internationally (e.g. Fjellstrom & Kritsmansson, 2016). In a similar way, while the quality of teaching in VET has been the subject of much discussion in Australia recent years (Wheelahan & Moodie, 2011) and internationally (e.g. Ofsted, 2014), there has been little specific focus in Australia specifically on teachers of apprentices. Moreover, while apprenticeships have been the subject of much public attention in Australia over recent years there has been a neglect of public attention to how they are taught, with the focus primarily being on matters of their employment. For example a major government study (Australian Government, 2011) did not mention teaching and learning at all. This uneven emphasis is not confined to Australia (Smith & Brennan Kemmis, 2013).

This paper aims to begin to redress the balance on a small scale, by looking closely at the teaching practices of VET teachers who primarily teach apprentices (although they may teach in other courses – for example, at Diploma level - as well). The sample for both the survey and the qualitative components of the study was drawn both from teachers working in the public ('TAFE') system and the private training system. The research question for this paper is ‘What teaching approaches do college-based trade teachers employ?’

In Australia, the term ‘apprentice’ is very much confined to traditional craft and manufacturing occupations, known collectively as ‘trades’ (Smith & Keating, 2003). While the system was expanded in the 1980s to incorporate other occupations such as retail, business and IT, the apprentice-like arrangements for those occupations are known as traineeships (Smith, Brennan Kemmis, Brennan Kemmis & Smith, 2009) and do not have the same status nor do they have equality in status or in funding arrangements. Numbers in traineeships have fallen dramatically recently due to funding changes, while traditional trade apprenticeship numbers have remained relatively constant at around 130,000 (NCVER, 2017). This paper is confined to teachers in the traditional trade apprenticeships. In most instances, apprentices in Australia take three to four
years to complete their apprenticeship. Their off-the-job training is the responsibility of a registered training organisation (RTO) selected by their employer. RTO is the term used for training providers who are registered and audited in the system and covers TAFE Institutes and private providers alike. Apprentices attend an RTO either weekly on day release or in blocks of several days or weeks. The Australian system allows for what is known as ‘fully on-the-job’ apprenticeships (Wright, 2016), although they are uncommon; in such cases the RTO is required to send a teacher on-site for a specified number of visits each year.

**Methodology**

A lengthy on-line survey of VET teachers and trainers (n=550) was administered in 2016, through participating RTOs, as part of a larger project on VET teachers and their qualifications, which was funded by the Australian Research Council and industry partners from the VET sector. 26 responses were from trade teachers who mainly or wholly taught apprentices (Table 1).

**Table 1: Survey respondents who primarily taught apprentices**

<table>
<thead>
<tr>
<th>Industry area of survey respondents</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive retail and repair</td>
<td>4</td>
</tr>
<tr>
<td>Construction</td>
<td>4</td>
</tr>
<tr>
<td>Manufacturing and engineering</td>
<td>7</td>
</tr>
<tr>
<td>Commercial cookery</td>
<td>6</td>
</tr>
<tr>
<td>Utilities and electrical</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
</tr>
</tbody>
</table>

The survey questions about teaching approaches utilised a set of VET teaching standards that had been developed with wide consultation nationally, by the Queensland College of Teachers (See Appendix). There are five Standards, which in turn contain 23 items altogether, covering all aspects of teaching and training in VET. The five Standards are as follows:

1. Know learners, their context and how they learn;
2. Know the content and how it can be taught;
3. Plan, design and deliver effective teaching/training experiences;
4. Assess, provide feedback and report on learning; and
5. Engage with industry, colleagues, community, regulatory and professional bodies

The survey respondents were asked to say, for each of the 23 items, using a scale of 1 to 5, how important they thought each standard was for VET teachers; and what their personal level of confidence was in that item. Respondents were asked to provide examples of how their teaching addressed selected items. The Standards and their constituent items are listed in the appendix.

In addition, analysis was undertaken of focus groups of trade teachers discussing their teaching. These focus groups, in two Australia States and Territories in 2015 and 2016, were undertaken as part of case study visits to investigate teaching practices and the effects of qualifications on them. Teachers from the construction trades and from commercial cookery were involved in these teacher groups. The focus groups analysed for the paper were undertaken by the author of this paper and each session lasted around one hour. Ethics Committee approval was gained for the research, and all focus groups were taped, with permission, and transcribed. Table 2 shows the focus groups and their composition.

**Table 2: Composition of teacher focus groups**

<table>
<thead>
<tr>
<th>Focus group no.</th>
<th>Teacher or student group?</th>
<th>Type of training provider</th>
<th>Industry area</th>
<th>No. of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Teacher</td>
<td>Public (TAFE)</td>
<td>Building</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Teacher</td>
<td>Public (TAFE)</td>
<td>Commercial cookery</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>
The number of participants was small, but the total data set for this paper – including the quantitative and qualitative phases - includes trade teachers from both major types of training provider and a range of industry areas, improving generalisability.

Results

Findings from the survey

A brief summary of the quantitative findings follows. The teacher respondents to the survey (n=550) were divided into three different types for analysis – trade; non-trade professional - e.g. nursing; and non-trade ‘other’ – e.g. business. The trade cohort as a whole showed statistically significance differences from the other groups. For each of the five standards, trade teachers attributed lower importance to the constituent items than other groups; and their personal confidence was lower than ‘non-trade other’ for each standard, too. However, it needs to be stated that the teachers of apprentices formed only a minority of the ‘trade’ cohort, as there were other respondents from the relevant industry areas who were teaching higher-level qualifications than apprenticeships. When groupings were undertaken by specific industry areas, manufacturing and automotive teachers showed the lowest confidence of any group; however, again these calculations included all those teaching in those industry areas not just those who concentrated on apprentices.

For the survey’s qualitative data reported in this paper, the responses of only the 26 respondents specifically identified as teachers of apprentices (hereafter called ‘trade teachers) were included. Teachers were asked to select one item within each standard to provide comment on how they implemented that particular skill. For reasons of space, only the most frequently chosen item in the first three standards are presented here (Table 3). Standard 5 was not included in the analysis as it is not directly related to pedagogical practice; and Standard 4 responses are also not provided, as they related mainly to matters of compliance with the regulatory regime for assessment of students.

Table 3: Analysis of qualitative responses from trade teachers relating to implementation of items from the VET Practitioner Standards

<table>
<thead>
<tr>
<th>Most popular item in each Standard</th>
<th>No of responses</th>
<th>Responses typical of ‘more thoughtful’ and ‘less thoughtful’ (in italics) respondents</th>
</tr>
</thead>
</table>
| 1.5 Understand a range of inclusive strategies to encourage participation | 7 | • Using a variety of modes and methods to cater for the wide range of learners’ capabilities.  
• Sometimes I remove the learners from the classroom environment… this opens up a different paradigm.  
• I find social learning useful in practical and theoretical lessons.  
• Language literacy and numeracy assessment |
| 2.1 Demonstrate current industry knowledge and skills | 10 | • Keeping up to date with innovations and new products relevant to the automotive trade qualification.  
• I worked in the hospitality industry for 40 years and have always shared my experiences with my students… this has been a great learning tool.  
• When assessing the [students’ work] I garner evidence of evolving work practices and [use of] new technologies.  
• [Teachers] must have been a tradesman for min. of 10 years |
| 3.4 Reflect on your practice to improve the learning experience | 10 | • I am always looking at better ways of delivering training that engage the apprentices better with the latest technologies.  
• I found reflecting with another like-minded teacher enabled a synergy of ideas that results in improved delivery.  
• I regularly discuss classes I have taught, with my peers. |

The choice of items for comment is in itself interesting. For Standards 2 and 3, clear ‘winners’ in chosen topics for discussion, while for Standard 1 the most popular item was not far ahead of
the runner-up. For Standards 2 and 3, then, the choice indicates trade teachers who are proud of their industry expertise and its contribution to their teaching, and also keen to improve their pedagogy through reflection. The qualitative comments generally confirm this picture of the trade teacher, showing teachers keen to experiment with different teaching methods, to learn from a range of sources themselves, and to discuss their practice with colleagues. However, some comments were more pedestrian, indicating an uneven level of sophistication. The less thoughtful responses are indicated in italics in Table 3. Item 3.4, however, had no ‘pedestrian’ responses.

Findings from the focus groups

The two focus groups were with quite different groups of teachers. A brief overview follows.

Group 1: Building teachers: These were older teachers who taught at a rural TAFE Institute in Victoria and were not well qualified; they had Certificate level qualifications in their trades and had all studied to Diploma (sub-degree) level, as part of their current employment, in VET pedagogy. They had all only undertaken the latter as it qualified them for a pay rise, but all stated that they had learned quite a lot from the qualification. Their apprentice students were quite diverse in age and ethnicity, and many had literacy problems. The students came in for block release from time to time and quite a lot of the teaching involved workplace visits by the teachers and on-line contact.

Group 2: Commercial cookery teachers. These taught at an inner-city TAFE campus in Queensland. They were both well qualified and had long industry experience. Teacher A was German and had qualified to Meister status. Teacher B had undertaken a degree in VET pedagogy, giving up his job to study full-time for a year. Teacher A taught on campus and had international student cohorts as well as apprentices. Teacher B worked currently in a relatively junior position which mainly involved teaching apprentices in their own workplaces - i.e. apprentices learning fully on the job’.

Group 1 teachers had developed, collectively, quite sophisticated ways of addressing the way they taught their students and dealing with the fact that the students were distributed over a wide geographical area. They had learned to be flexible, to make teaching arrangements that suited the employers, and to use technology to teach and assess students. They had also learned to work with other departments within the college (whom they had got to know through studying alongside them in the Diploma of VET) to extend their apprentices’ learning. The teachers agreed that the best thing about teaching apprentices was to see them develop and mature over the years and, one said, to see the ex-apprentices he had taught send their own apprentices for training. The teachers developed relationships of trust with employers so that they could discuss individual apprentices’ progress, so that it became, as one put it, ‘a team thing between us and the builders.’ They all said that they trained the apprentices as they would if they were in a workplace, which sometimes involved a lot of ‘yelling’ if the apprentices misbehaved or made mistakes. When talking about their own learning about teaching they referred to learning about the industry from doing site visits and from hearing the apprentices ‘talk among themselves’ at college about what they did in their workplaces. They also asked apprentices questions about their workplaces (e.g. materials being used) based on what they saw in the photos that apprentices sent in to have their workplace tasks assessed.

In Group 2, Teacher A said that he set up his training kitchen like a workplace and that he kept apprentices on task and reprimanded those who made mistakes. Teacher B reported with pleasure that the students whom he visited in workplaces called him ‘chef’; and similarly reported provided ‘corrective action’ to students who failed to pick up on what he was explaining. Despite their firm rooting in their trade, both of these teachers placed more emphasis than did Group 1 teachers on formal learning about teaching, stating that pedagogical qualifications were essential to equip VET teachers to help students learn, and that industry knowledge was not sufficient. In
terms of their own future development, both looked to qualifications rather than informal professional development.

Conclusion

From the survey, trade teachers’ approaches to teaching appeared to vary from a few who seemed to focus primarily on what was required of them to meet VET regulatory requirements, to a larger number who thought deeply about their teaching and sought to meet the learning needs of all of their students. The focus group members’ approaches also differed, seeming to be shaped by the length of prior industry experience before becoming VET teachers and by the teachers’ qualification levels. Some specific approaches appeared to emerge from both sets of data as characteristic of apprentice teaching: the responsibility taken for development of the ‘whole person’ of the apprentice, the partnerships with employers, the replication of workplace practices in the classroom, and the constant iterative learning including learning by teachers from the apprentices and the apprentices’ workplace practices. The findings are limited by the small size of the sample. As the project has only just concluded, there is more data from trade teachers available for analysis, which may render the findings more robust. However the focus of the project was not specifically on trade teachers, and it is suggested that there is a need for larger-scale research into the teaching of apprentices.

Acknowledgement

The author would like to acknowledge co-researchers Keiko Yasukawa, Roger Harris, and Jackie Tuck.

References


Measuring Experience-Knowledge as factor for “Industrie 4.0” (Industrial Internet of Things)

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Summary: The German project “Industrie 4.0” (Industrial Internet of Things) includes, among other factors, the availability of information and knowledge which can be derived from any source at any time within the value chain of an industrial production process. The planned research challenge the importance of tacit knowledge according to Michael Polanyi’s paradox. It investigates if intuitive and unarticulated knowledge can be identified, understood, communicated and codified into an information based ‘experts system’. It examines the simple work task of “demounting and mounting 6 union-nuts in a K-Jetronic” (a full-mechanical fuel distribution board of a fuel-injected engine of an automobile).

Keywords: Industrial Internet of Things, expert system, tacit and explicit knowledge, VET, Polanyi’s paradox

Introduction

The German term ‘Industrie 4.0’ is the expansion of the classical industrial production with modern information- and communication-technology. The key aspect is the use of internet technology for communication between people, machines and products (Industrial Internet of Things = IIoT) with the ultimate aim to maximize the output of the value chain through differentiated and flexible production planning supported by an expert system. The information-based “expert system” will steer the production process and logistics of a workshop or production plant.

The expert system must have several sets of data including cutting data, order-stock and customer requirements (like quality, e.g.) combined with rules and/or algorithms. The result of such combining is an action for automatically steering the production process.

It is not overambitious to call this type of an expert system the “heart of the IIoT-Process”. In our labor world, the quality of the process of continued optimization within the supply chain will become the most important factor for competitiveness, and the key question is whether human cognitive or physical involvement will still prove to be advantageous within the production process.
This research will investigate whether experience knowledge can be transformed into the expert system, and/or whether skilled work can be trained from optimized and efficient work-processes during the VET? The answer to this question will determine whether humans will continue to play a relevant part in the expert system in the future economy and how VET needs to be further re-designed/re-engineered to create competence through training for skilled work?

Assuming that this expert system will be the future of industrial production, following questions need to be addressed:

1. The data can be collected automatically, but who is able, to analyze the data regarding failures, non-optimal data-settings or missing data-cases?
2. Who will be able to set rules and to create algorithms by using the data and validate the various production types and/or orders?
3. How can these rules be generated considering the fact, that most of them are based on work-process-knowledge, which is often named “experience-knowledge”. This skillset is not really detectable or documentable, because it exists on the level of tacit knowledge.

Data and information are essential prerequisites to generate work-process knowledge/experience knowledge. This knowledge is not based on accumulation of information, but it is generated through interconnection and interpretation of information from already existing previous experience.

Knowledge is categorized in explicit and tacit knowledge. Explicit knowledge is phraseable and repeatable. It can be easily communicated through a formal, systematical language, like words, numbers, codes, etc. It is logical and can be described which characterizes a specific, methodical knowledge and can be described by algorithm.

In 1961, the philosopher and polymath Michael Polanyi observed the following: “We know more than we can tell....”. Polanyi’s observation largely predates the computer era, but the paradox he identified is that our tacit knowledge of how the world works often exceeds our explicit understanding. Tacit knowledge does have its own personal quality, which is intuitive and unarticulated knowledge that cannot be communicated, understood or used without the ‘knowing subject’. The transfer of tacit knowledge can be justified with close interactions, understanding and collaboration in a specific context. Tacit knowledge starts with the subjective perception of each individual and can be defined as skills, ideas and experience that people have in mind, but difficult to access because it may not be easily expressed, explained and cannot be codified. People are not often aware of the knowledge they possess.

Experience is the main factor to acquire tacit knowledge which derives from interpretation of information and interconnection based on previously gained and reflected experiences. This includes cognitive abilities how to handle concepts and experience as well as the capability like fine-motor skills of an experienced mechanic. The transfer of this knowledge presumes an intensive interaction process.

Within IIoT, automation primarily uses information, explicit knowledge and procedures that we already know/do and codifies these steps into machine/computer
program. The machine/computer program executes the task by following a set of codified explicit procedures.

However, tacit knowledge it is a challenge to codify the information, since we actually are unable to verbalize the particular way, a task is being accomplished.

In this context, following research questions will be investigated based on a simple work task of demounting/mounting 6 union-nuts of a K-Jetronic (a full-mechanical fuel distribution board of a fuel-injected engine of an automobile):

- To what extent is the worker aware of tacit knowledge?
- To what extent is the worker capable (by using instruments and work process analysis) to verbalize and to formalize tacit knowledge?
- Can this knowledge be transformed/codified in explicit knowledge within an expert system?
- How can the worker be trained in VET-oriented learning processes to realize this transformation?

**Methodology**

The null hypothesis of this upcoming project is:
‘Human tacit knowledge cannot be replaced by computers servers, robotics and machines. It is not possible to verbalize and codify tacit knowledge into an expert system’

The working hypothesis is:
‘Human tacit knowledge can be replaced by computers, servers, robotics and machines in the future and it is possible to verbalize and codify tacit knowledge into an expert system’.

This task is based on the evidence of Adolph (2001), which proves that demounting of a screw is a design-oriented work task.

The main project will be set-up and it is planned to be performed in January 2018. 20 test persons from different educational engineer background (novice to expert) will demount/mount the 6 union nuts in a K-Jetronic. This task will be performed 3 times on 3 different days, but same timing.

Following work items will be captured and analyzed:
- Pre-test questionnaire: professional educational background, etc.
- Observation: Ergonomics: standing position and movement
- Observation: Visual attention
- Strategy: sequence of demounting the 6 union nuts: which sequence will the test person use to demount the 6 union nuts (see table 1 and video)?
- Quality: position & condition of union nuts, time, test process, use of torque meter
- Post-test questionnaire: can the person verbalized his work process?
Table 1: Bird’s eye view of the K-Jetronic flow-divider

Tools used:
- 3 video cameras
- E-Glove
- W-Lan torque meter
- Eye tracker

Analysis

Outcome of the research project will be analyzed according to the following knowledge approaches:
- **identification** of tacit knowledge
- **verbalization**: person can show the task, but cannot talk/explain it in an adequate way.
- **codification**: transform expert knowledge to data and rules
- **experience knowledge**: gained experience through expert and novice training, personal experience and practice

The pre-test with a smaller number of persons and the expected results are summarized in the below overview:
Table 2: Expected results of “Micro-Process-Analysis”

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Expected test result novice</th>
<th>Expected test result expert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Glove</td>
<td></td>
<td></td>
</tr>
<tr>
<td>measures the maximum weight of the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>screw wrench by pushing or pulling</td>
<td></td>
<td></td>
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<tr>
<td>unions</td>
<td></td>
<td></td>
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<tr>
<td>Torque meter</td>
<td></td>
<td></td>
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<tr>
<td>with WLAN-connection:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>measures the torque moment</td>
<td></td>
<td></td>
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<tr>
<td>Eye tracker</td>
<td></td>
<td></td>
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<tr>
<td>measures the visual attention of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the test person</td>
<td></td>
<td></td>
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<tr>
<td>- cognitive search: focus/search...</td>
<td></td>
<td></td>
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<tr>
<td>- eyes are not fixed</td>
<td></td>
<td></td>
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<tr>
<td>- emotional process</td>
<td></td>
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<tr>
<td>- reaction time</td>
<td></td>
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<tr>
<td>Camera</td>
<td></td>
<td></td>
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<tr>
<td>records test person</td>
<td></td>
<td></td>
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<tr>
<td>standing position and movement</td>
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<tr>
<td>variability</td>
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<td></td>
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<tr>
<td>- number of failures are high</td>
<td></td>
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<tr>
<td>- incomplete embedding of union</td>
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<tr>
<td>- elevator angle</td>
<td></td>
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<tr>
<td>- pressing more than pulling</td>
<td></td>
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<tr>
<td>- standing position: changing</td>
<td></td>
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<tr>
<td>- under strategy</td>
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<td></td>
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<tr>
<td>- number of failures are low</td>
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<tr>
<td>- complete embedding of union</td>
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<td>- elevator angle</td>
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<tr>
<td>- pressing more than pulling</td>
<td></td>
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<tr>
<td>- standing position: constant</td>
<td></td>
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<tr>
<td>- looking at the engine</td>
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<tr>
<td>Overall success factor</td>
<td></td>
<td></td>
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<tr>
<td>- work completed</td>
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<tr>
<td>- time to complete the task</td>
<td></td>
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</tr>
<tr>
<td>- union nuts damaged</td>
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<tr>
<td>- work completed</td>
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<tr>
<td>- time to complete the task</td>
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<td>- union nuts damaged</td>
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</table>

Initial results

This research is an attempt to challenge Polanyi’s paradox: ‘We know more than we can tell…’

Through observation, discussion and interpretation under the same condition and framework, our initial result show, that

codifying tacit knowledge for expert system is to some extent feasible; however humans will retain some advantages over machines for the foreseeable future. The implementation of “Industrie 4.0” technology has reached a natural and important limitation.

Thus how can worker/designer of Industrie 4.0 break-up this limitation?

1) Polanyi, M. 1966, Implizites Wissen, Suhrkamp Taschenbuch Wissenschaft, page 14
Literature

Polanyi, M. 1966, Implizites Wissen, Suhrkamp Taschenbuch Wissenschaft, page 14


Lessons learned from the Implementation of Ireland’s First Degree Level Apprenticeships Using the BA (Honours) in Insurance Practice.

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Summary: This paper investigates the effectiveness of the development and implementation of the Insurance Practice apprenticeship in Ireland, using the European Commission’s Guiding Principles for High-Performance Apprenticeships and Work-based Learning and recent developments in apprenticeship in Ireland as the frameworks through which this case study is investigated. Using the Guiding Principles, in particular focusing on first two principles in the National Governance and Social Partners’ Involvement pillar of the principles, and demonstrating the central role that these play in the Irish apprenticeship system, the paper explores the development of the Insurance Practitioner Apprenticeship leading to BA (Honours) in Insurance Practice, recognising the roles of the social partners involved and their interaction.

Keywords: Partners, Governance, Insurance, Degree.

Introduction

Insurance practitioner apprenticeship

The Insurance Practitioner apprenticeship was the first new degree apprenticeship in Ireland. A collaboration between the Insurance Institute of Ireland (III), IT Sligo (ITS) informed by an industry consortia steering group (CSG), commenced in September 2016 with 67 apprentices. The projected intake for September 2017 is almost 100 apprentices.

Irish context

Apprenticeship in Ireland has undergone significant reform since the results of a national review of apprenticeship training was published in 2014. The changes include expansion of apprenticeship into new industries and sectors of the economy and for new target groups, new methods of delivery, and qualification at new levels in the National Framework of Qualifications.

A preliminary review of the reform process and outcomes showed conformance with the Model Apprenticeship Principles and indicated that the new model, which builds on a strong tradition of apprenticeship in Ireland, is in line with good practice among other countries (Doran, 2015). A range of apprenticeships have been developed in accordance with this new industry-led approach, and the Insurance Practice apprenticeship was the first of these to be launched in September 2016.

European context
The European Commission’s Guiding Principles, published in December 2015, respond to four policy challenges that are considered important to address in the promotion of apprenticeships and other forms of work-based learning:

- national governance and social partners’ involvement;
- support for companies, in particular SMEs, offering apprenticeships;
- attractiveness of apprenticeships and improved career guidance; and
- quality assurance in work-based learning.

The first of these notes that (1), a clear and consistent legal framework to enable apprenticeship partners to act effectively in the context of mutual rights and responsibilities, and (2), structured, continuous dialogue between all apprenticeship partners including a transparent way of coordination and decision-making, are two principles that underpin high-performance apprenticeships. These two principles are embodied in the Irish apprenticeship system, and have proven to be important in the development of the Insurance Practice apprenticeship.

**Methodology**

The paper uses a case study methodology, recognising that many scientists believe that case study research is only useful in the preliminary stages of an investigation (Yin, 2009, P6). As the insurance practitioner apprenticeship programme which is the subject of this case only commenced with its first cohort in September 2016, this paper is a preliminary investigation into the development of new apprenticeship in Ireland and reflects on the lessons learned in the development of the Insurance Practitioner apprenticeship. It is anticipated that this research will continue and that as the research develops in the future different methodologies may be adapted.

**Results**

*National Governance and Social Partner Involvement in Irish Apprenticeship*

In Ireland, apprenticeship partners include the apprentice; the industry-led Consortium (CSG) that develops an apprenticeship programme and oversees its roll-out and ongoing relevance to the needs of industry; the Apprenticeship Council appointed by the Minister for Education and Skills which includes representatives from enterprise, the Irish Congress of Trade Unions (ICTU), further and higher education and training bodies, and the Department of Education and Skills; the Higher Education Authority (HEA) and SOLAS, the statutory authority for apprenticeship in Ireland. This model draws on and is informed by the National Skills Council, Expert Group for Future Skills Needs (EGFSN) and Regional Skills Fora.

*Status of Apprenticeship in Ireland*

The unique status of apprenticeships in Ireland is enshrined within the 1967 Industrial Training Act which governs all statutory apprenticeships. Key functions of SOLAS, the statutory authority for apprenticeship, include designation of apprenticeship programmes on a statutory footing; a process for approval of employers’ suitability to train apprentices and a register of approved employers; and maintenance of a register of apprentices nationally.

The Act also grants powers to SOLAS to appoint Authorised Officers, who assess employers’ suitability to train and potential apprentices’ eligibility to be employed as an apprentice in a specific apprenticeship, and they monitor apprenticeship training.
activities (Section 42). The Insurance Institute in Ireland (the industry lead body for the Insurance Practice apprenticeship) and the Institute of Technology Sligo (the coordinating provider of the apprenticeship) both liaised with the Authorised Officers throughout the country in the employer approval and apprentice registration processes. The strength and successful development of this apprenticeship was the lead role of the industry partner in consolidating support for this apprenticeship programme and the strong relationship with IT Sligo, which delivered a responsive and timely programme.

Other legislation introduced since 1967 is also relevant, in particular the 2012 Qualifications and Quality Assurance (Education and Training) Act which provides a statutory framework for quality assurance and validation of all education and training programmes. The Core and Topic Specific Statutory Quality Assurance Guidelines developed by QQI for Providers of Statutory Apprenticeship Programmes (QQI, 2016) redefine the apprenticeship landscape with the social partners leading apprenticeship development, provision and quality assurance through the formation of the industry-led Consortium for each apprenticeship.

Dialogue between all Apprenticeship Partners including a transparent way of Coordination and Decision-making

As noted above, the apprenticeship model in Ireland includes a range of partners working together to ensure that apprenticeships meet the skill needs of industry and the learning needs of apprentices, and the apprentice is at the centre of this.

At the beginning, however, the development of new apprenticeships, with the insurance practitioner apprenticeship as the first, represented ‘uncharted territory’ for many. The legislative framework mentioned above, and the creation of resources to support the development and implementation of new apprenticeships helped to successfully navigate this uncharted terrain over time. The QQI Topic Specific Guidelines, for example, were instrumental in this regard (QQI, 2016). The subsequent publication of the 10-step ‘Critical Path’ apprenticeship development process, and the accompanying Handbook for the Development of National Apprenticeships - both of which were informed by the development of the Insurance Practice apprenticeship – have helped to provide a common ‘lens’ to facilitate understanding, coordination and decision-making in the development and implementation of individual apprenticeships (see www.apprenticeship.ie).
According to Steedman, “apprenticeship is strongest in countries where both employer and employee representative organisations wholeheartedly support and promote apprenticeship and the conditions necessary for its success” (Steedman, 2012, p. 11). The Irish Insurance Institute as a professional body has played, and continues to play a key role at system level, and in conjunction with other apprenticeship partners, in the governance and success of the Insurance Practice apprenticeship programme.

The lessons learned include:

- Legislation, social partner involvement, guidelines and other resources have provided a useful means of facilitating mutual understanding
- These, and the experience of their development and utilisation has led to increased confidence and competence for the future
- Recognition of the need to continuously improve the apprenticeship development and implementation processes, to share the learning, and to adequately resource the various elements of, and partners involved in, the process over time

**Conclusions**

The key benefits of the process benchmarked against the first two of the High-performance apprenticeship and work based learning guiding principles as follows:-

- A clear and consistent legal framework enabling apprenticeship partners to act effectively and guaranteeing mutual rights and responsibilities.
- A structured, continuous dialogue between all apprenticeship partners including a transparent way of co-ordinating and decision making.
- Strengthening the role of social partners by capacity building, assuming ownership and taking on responsibility for implementation.

One of the outputs of the process of the development of the Insurance Practitioner apprenticeship was the publication of the 10-step ‘Critical Path’ apprenticeship development process, and the accompanying Handbook. This handbook was written based on the learning from the development of the Insurance Practitioner apprenticeship and will be used to guide the development of further apprenticeships in Ireland

**Literature**


Topic 4:
Innovative Teaching and Learning
Enhancing Apprentice Training Through Supervision

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Director of Apprenticeship, Urban Works Foundation
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Summary: The problem of this study was to determine if an apprenticeship experience was enhanced by the type of supervision given during the work-related component of a program. To aid current and potential companies offering apprenticeship programs, this study identified a population of apprentices ($N = 877$), tracked them from entry into the program until five years after graduating, and analyzed their outcomes relative to program completion, academic GPA, work-related GPA, company longevity, and company promotion between those apprentices that were supervised under three unique conditions. Significant differences were found between supervision type relative to completion, academic GPA, work-related GPA, and promotion.

Keywords: Workforce Education, Apprenticeship, Supervision, Career and Technical Education, Training, Industry Education, Adult Education

Introduction

Apprenticeship, and its associated model of development, is a proven methodology for obtaining a higher education while advancing relevant skills needed in high-demand industries (Lerman, 2012). It combines a complementary blend of college-level academic courses, career theory (training), and relevant work experience in the form of cooperative or full-time employment within an occupational area (Cantor, 1997; Lerman, 2012). Unique to this model of development is a guiding structure that encourages an identified set of legitimate performance experiences moving from simple to complex; modeling, scaffolding and fading instruction; and articulation and reflection (Collins, Brown, & Holum, 1991; Fuller & Unwin, 2004; Lave & Wenger, 1991; Rosenheck, 2013). Filliettaz (2010) explained that supervisors often act as gatekeepers to the community, and they are significant contributors in apprentice success. In apprenticeships of the past, a master craftsperson meticulously supervised the work-related component and mentored a small group of young apprentices into work and life while articulating context from the apprentice’s education and training (Barlow, 1974; Brewer, 2011). This model of development served the United States labor market well and helped the country secure its high status among the global community. Today, however, the master craftsperson approach and its one-on-one mentorship interactions have become expensive and impractical to employ (Brewer, 2011). Apprentices typically serve the work-related component alone at the job site under the direction of a front-line foreman as a supervisor who is often overburdened and ill-prepared to focus on the contextual articulation of the apprentice’s education and training (Ellinger, 2013; Fuller & Unwin, 2009). As apprenticeships in the United States continue to evolve regarding internal components, it is not known if and to what extent the type of supervision provided to apprentices during the work-related component of a program either enhances or
exacerbates the apprenticeship experience. To guide this study, the following research questions were developed.

RQ1: Is there a difference in program completion between apprentices who were supervised by master craft instructors, frontline foremen, or a mixture of master craft instructors and frontline foremen?

RQ2: Is there a difference in academic Grade Point Average (GPA) upon completion of program between apprentices who were supervised by master craft instructors, frontline foremen, or a mixture of master craft instructors and frontline foremen?

RQ3: Is there a difference in work-related GPA upon completion of program between apprentices who were supervised by master craft instructors, frontline foremen, or a mixture of master craft instructors and frontline foremen?

RQ4: Is there a difference in company longevity within five years of completing the program between apprentices who were supervised by master craft instructors, frontline foremen, or a mixture of master craft instructors and frontline foremen?

RQ5: Is there a difference in company promotion within five years of completing the program between apprentices who were supervised by master craft instructors, frontline foremen, or a mixture of master craft instructors and frontline foremen?

Methodology
This study was a non-experimental ex post facto case study investigation of program success through the type of supervision given during the work-related component of an apprenticeship. It tracked students who enrolled in a post-secondary apprentice school during the years 2002, 2003, and 2004 (N = 877) for five years after graduating from the program. It employed a convenient nonrandomized sample comparison designed to determine if apprentice and company sponsor success was enhanced by the type of supervision given during the work-related component of an apprenticeship program.

This study compared apprentices in three groups: those who were supervised entirely by master craft instructors, those supervised entirely by frontline foremen, and those who were supervised under a combination of the two methods. Master craft instructors have the same supervisory duties of a frontline foreman, but with additional coaching, mentoring, and human development responsibilities and expectations. As Filliettaz (2010) illustrated, the interactions between apprentices and their supervisor is critical. In this study, apprentices were conveniently categorized into one of the three groups depending on the method of supervision. The researcher used a Chi-square test to analyze program completion (RQ1) between the three groups. Analysis of Variance (ANOVA) was then used to analyze differences in academic GPA (RQ2), and work-related GPA (RQ3). Company longevity (RQ4) was analyzed in two ways: the status (still employed by the sponsoring company or not); and if not with the company, the length of time before leaving the company. Significant difference in longevity status was determined by a chi-square test and longevity length of employment used an ANOVA. Company promotion (RQ5) was analyzed in three ways: promotion status (promoted or not); if promoted, the time at which the promotion occurred; and if promoted, the number of promotions within five years of completing the program. A chi-square test was used to determine if a significant difference existed in promotion status. Promotion timing and number of promotions used an ANOVA test to determine significant differences.

Results
The findings from each of the research questions of this study determined that differences existed between supervision type regarding important outcomes. Significant differences existed between supervision types in all outcome variables except longevity (RQ4). Completion rates (RQ1) for apprentices supervised by only master craft instructors throughout their entire apprenticeship experience were significantly lower than those in the other two groups. Looking at work performance, the average work-related GPA (RQ3) was also significantly lower for the group supervised by only master craft instructors. Inversely, academic GPA, longevity, and promotion revealed more positive outcomes from being supervised by only master craft instructors. Academic GPA’s (RQ2) were on average higher for the completers having been supervised only by master craft instructors and significantly higher from the combination group. Longevity and promotion are particularly important to a sponsoring company when determining the rationale for funding a program as these variables begin to provide the returns for the expenditures. Of those that completed, the percentage of graduates still working with the sponsoring company after five years (RQ4) was higher for those having a master craft instructor when compared to their counterparts in the other two groups (combination and frontline foremen). Analyzing the length of stay from those that chose to leave within the five year time frame, graduates supervised by only master craft instructors also stayed with the company longer on average than those in the other two groups. Regarding promotion (RQ5), significant differences were found between those apprentices having been supervised by only master craft instructors and the combination group, where the master craft instructor group was promoted at significantly higher percentages and promoted significantly sooner within the five year time frame of this study.

This study being a non-experimental ex post facto study, it cannot draw causal inferences from supervision type to the dependent variables. It can only be stated that differences existed between groups having been supervised under the three conditions and does not begin to identify which method is more superior to the other. Although beyond the scope of this study, the findings did create a belief that the master craft instructors could be acting more aggressively than frontline foremen in protecting the sponsoring company’s long-term return on investment. Although additional research is needed, master craft instructors could be weeding-out the weaker apprentices before completing the program and instilling company loyalty to those worthy of completing, thus allowing their population of graduates to be more efficient and knowledgeable than the other two groups. Further inquiry is needed to draw such inferences, however this belief would agree with the research by Filliettaz (2010) where he explained that supervisors act as gatekeepers to the occupational community and treat newcomers either positively or negatively based on their perceptions of the apprentice’s ability.

Finally, this researcher encourages caution in drawing broad conclusions related to this study’s findings. For instance, stopping at just completion and GPA could give credence that being supervised entirely by master craft instructors is a disadvantage. After all, a higher number of apprentices that entered the program that were supervised by master craft instructors did not complete; and the difference was significant. However, considering longevity and promotion, the completers supervised by master craft instructors outperformed the completers in the other two groups. Again, this study only begins to suggest supervision type as a contributing factor in the differences found in the dependent variables. Therefore, it is recommended that further research be conducted investigating the possible causes.
contributing to the outcomes and how those outcomes might impact the businesses that choose to sponsor and pay for the apprentice program.

**Literature**


Using Digital Technologies in the training of Craft Apprentices: Is this the Future?

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Summary: This short paper gives an overview of three likeminded studies from an Institute of Technology in Ireland. Whether it be blended learning, mLearning or eLearning, the overall objective should be to keep the student at the centre of this learning. If the use of technology in training and education can help achieve this then it should be utilised where possible. With the ubiquitous nature of smart phones and its use for viewing video and gaming it seems only logical to integrate the use of these devices into formal learning situations. Especially considering the smart phone is the first port of call for most people seeking information on any given topic. From the results of these three case studies not only will the use of digital technologies in training be developed and adopted in the future. They are the future.

Keywords: digital, eLearning, mLearning, blended learning

Introduction

Recent reviews of apprenticeship training in Ireland have identified the need for learners to acquire transferrable skills in ICT and the potential for e-learning to support delivery of training (Department of Education and Skills, 2013). There is an increasing recognition that a “cognitive learning element in many trades and professions has rapidly increased, as trades have required more academic learning” (Bates, 2015).

This paper draws on three studies by the authors which explore the potential of e-learning to enhance delivery of apprenticeship training for construction trades. Study 1) (Mobile Learning) The use of mobile learning to provide video demonstrations for bricklaying apprentice students; Study 2) (Digital Workshop Interface) The creation of a digital workshop interface software for electrical students to complete the practical elements of their course and: Study 3) (Blended Learning) The development and instructor evaluation of a pilot blended learning module on low energy buildings to up-skill construction workers.

Mobile Learning

The first study details the use of mobile platforms to complement formal learning with informal learning in an apprenticeship context. Beginning with a problem identified with Bricklaying students achieving psychomotor learning outcomes for a module in arch construction, mainly due to high student numbers and limited available workshop time. A solution is presented through the facilitation of the students using eleven short instructional video demonstrations, to optimise their workshop time. The videos were uploaded to the memory cards of the students’ own mobile phones.
bricks for various parts of a segmental arch, but this was not practical. Best practice for teaching practical psychomotor skills is through using demonstrations for modelling, drill and practice and rote learning (Toohey, 1999). Cognition and reflection is also required for mastering these skills (Reece and Walker, 2000). Situated learning is better as it is more authentic for the student (Whitaker, 2005) so demonstrations were needed in the workshop. Using handheld mobile devices could facilitate this, through simulating a decrease in the student/teacher ratio.

Methodology

Through action research, data was collected from sixteen 4th year students using a combination of a survey, a practical assessment, a focus group interview, and through keeping a research diary. The data for the study was analysed by following Miles and Huberman’s (1994) interactive model of data analysis (collection, display, verify, reduce).

Framework/ Literature

The literature was investigated from a dual perspective: technological advancements which have accelerated demand for mobile learning, and the pedagogy of mLearning (mobile learning), particularly content design, presentation and how the technology is used to support communication, collaboration, reflection and feedback in a learning environment. Fill and Otewill (2006) reveal that when using video for teaching “it is not enough to leave the learners alone to paddle, sink or swim in the stream” (p.406). Karpinnen (2005) also makes this point as does Laurillard in her seminal work on the use of educational technology in university teaching (1993). Laurillard maintains that learning takes place through conversation. In this study Laurillard’s conversational framework (1993) was adopted to illustrate this mediation through conversation and reiteration of understandings between the teacher and student using the medium of video along with the face to face interaction between teacher and student in the workshop.

Findings

This study explored the development of an innovative, student-centred way of improving the learning and teaching experience within the constraints of time and workshop space. It made use of an existing facility and technology that most of today’s students own themselves and of which they are familiar, i.e. mobile phones with video capability. This enabled students to progress at their own pace, and assisted the teacher to focus more on specific individual student needs in the time available. All the participants were in favour of using their own mobile phones for just-in-time training and more than 90% wanted to utilise this method of learning on their work sites.

Digital Workshop Interface

The second study looked at the creation of a digital workshop interface software for electrical students to complete the practical elements of their course. There were three primary considerations in the development of the workshop interface. The first consideration was to make sure the interface would be useful in the delivery of knowledge and in this case the curriculum as prescribed by Solás, who are the statutory body responsible for apprenticeship training in Ireland (Cook, 2001). The second consideration was to ensure that development of interface material accounted for various learning styles of potential users. This goal was achieved by collating the data obtained from a VARK learning style questionnaire as well as collaborating evidence
produced by the National Learning Network formally BUA (2004). The final consideration was to help re-create the typical engineering environment of a maintenance electrician (Pascale, 2006). As Boyle (1997) argues ‘learning tasks should be embedded in problem solving contexts that are relevant in the real world’.

Design

The design of the interface was based on an object-based multimedia flow system. This was accomplished by gathering relevant resources, combining these resources to create objects, and finally placing these objects to create a flow system. This system is traditionally thought of as a Behaviourist model, though using this type of system in conjunction with the practical electrical wiring element it would be more closely aligned to the Constructivist model (Cook 2001.)

Methodology

Drawing on the literature review, the qualitative research involved several semi-structured interviews with key informants within an Irish Institute of Technology. Focus groups and questionnaires were also utilized to collect information from a diverse group of individuals including apprentices, lecturing staff, management staff, and experts in teaching and learning techniques such as WebCt users, BUA. Quantitative findings from questionnaires were also extrapolated to indicate important themes relating to learning styles and their significance to apprentice learning.

Findings

The workshop interface that was created for electrical practical classes and evaluated by both apprentice learners as well as lecturers was met with a positive response. Apprentice learners more interested in mobile phones and PlayStation found it a comfortable and enjoyable way to learn. They appreciated that the material was delivered in a way more suited to their individual needs. Lecturers also discovered that using ICT learners could take ownership for their own learning.

Blended Learning

The third study explored, through instructor evaluation, the potential of e-learning to enhance the outcomes of an existing training programme for upskilling Irish construction workers on low energy building principles. For this study, five short interactive video animations were developed and evaluated.

Methodology

A case study approach utilising mixed methods was applied. Development of e-learning resources for the upskilling process was informed by a survey questionnaire of thirty construction skill’s trainers and two focus group sessions with 5-6 trainers who were involved in the development and delivery of face-to-face training on low energy buildings for construction workers.

Findings

Although this study was limited to an instructor evaluation of the five online interactive video resources developed, there was strong agreement that multimodal e-learning resources have significant potential to accommodate independent learning and improve learner readiness for face-to-face training. While there were some reservations about the capacity and willingness of construction workers to engage with
e-learning, it was concluded that such challenges could be addressed through a research-informed approach to design an induction for learners who may lack digital skills or confidence.

The findings of this study have significant implications for the objectives of Irish and European training initiatives seeking to support the achievement of energy saving targets for buildings. The results are also relatable to the potential of e-learning in craft apprenticeship and training of construction workers generally.

**Conclusion**

Using ICT in education should not be driven by the technology. The student and the learning outcomes must come first, whether in the classroom or on-site. If a focus on sound pedagogical principles is retained, apprenticeship training can benefit from the effective use of digital technologies in the future.

**Literature**

BUA. (2004); Initial Report on Screening and Identification of Specific Learning Difficulties with Apprentices.
Hennessy, S Ruthven, K and Brindley, S. (2005); “Teacher perspectives on integrating ICT into subject teaching: Commitment, constraints, caution and change;” Journal of Curriculum Studies, Volume 37, Issue 2
Teaching Creativity in VET

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Summary: The paper outlines the results of a literature review on creativity which has been conducted with a particular interest in unleashing the creative potential of VET students. The introduction into the theoretical foundations for understanding creativity within the field of VET is followed by insights into didactical approaches that can be applied within VET schools. The dimension of learning at the workplace and how a particular work environment and learning cultures within enterprises influence creativity development and innovation is briefly discussed at the end.

Keywords: creativity development, didactics, workplace learning innovations

What is creativity in VET?

There has been growing recognition that nurturing students’ creative potential is a valuable, yet often unrealized, educational goal. Much of the research focusing on creativity is concerned with the individuals’ intellectual skills promoting creativity, such as divergent thinking. In VET there is little research done so far on creativity development as a competency that supports innovation at the workplace. Moving towards a focus at team effort at the workplace requires an understanding of social practice and inter-subjectivity, which needs to be experienced within VET as supportive of creative processes and innovative practice (Tanggaard, 2014). The subject of inquiry is to elaborate on the questions of creativity unleashing and enhancement in the field of VET. How can schools provide opportunities for choice, imagination, and exploration as a collaborative endeavor within their VET curricula? What are didactical approaches that VET schools can follow in their instruction? Which examples can be found within Swiss enterprises for the development of skills that support creativity development among VET students?

The focus on VET is not least chosen, because learning for the world of work means to be prepared with the skills and competences that future workplaces will require, thus one needs to be able to dispose over a variety of skills that support creativity. Considering that Switzerland takes the lead in respect to the top five performers in the world according to the Global Innovation Index and that the larger part of its young adults pursues vocational education and training, research on the ways in which the innovative capacity of students in apprenticeships can be developed or strengthened seems to be particularly interesting in this context.

Methodology

Due to the lack of research on creativity development that supports innovation within the field of VET, a literature review was conducted drawing on literature from disciplines, such as psychology, communication science, neuro-science, sociology, cultural studies and management. The grand majority of literature in the field comes from Anglophone countries, especially the United States. Next to the inquiry about creativity, literature on the design thinking method (Brown, T. 2009, Plattner et. al. 2016) consequently applied at the D-school in Stanford, the Hasso Plattner Institute in Potsdam and enterprises, such as Swisscom, has been reviewed in order to
understand better how the implementation of methods in support of creativity leads to tangible innovations.

**The Foundations of Creativity in VET**

Creativity has been defined and studied by many scholars and is sometimes contrasted to innovation. One possible way of framing the construct is, that it describes the ability to produce work that is novel (original) and adaptive with respect to task or situational constraints (Sternberg & Lubart 1995). Innovation vice versa is viewed as the introduction of something new, which is useful at a market, for an organization or a society (Rustler 2016). VET education that nurtures the creative potential of students requires an innovative pedagogy that supports individuals by providing opportunities to face challenges, manage and analyse information, and work with knowledge (Reisman 2017). VET teachers are required to become facilitators of this learning process, leaving room for exploration and playfulness, allowing for divergent thinking and supporting convergent thinking to arrive at the development of tangible innovations, be it products, services, experiences or cultures. In order to do so, the teachers themselves need to be creative, which means playing with new ideas how to teach and trying out new teaching practices (Schön 1987). Particularly important is that they themselves experience what is essential for students, such as psychological safety and freedom (Rogers 1954).

For this to take place scholars have provided a variety of ingredients that support these processes. Particular emphasis is paid to teams, that are interdisciplinary with different characters, thinking styles and working habits represented in it – a target that could only be achieved, if VET students would increasingly be mixed across different vocational programs to work on well defined projects, instead of being instructed specifically within their domain. A focus on creativity would require more time to be given for exploration in teams. Baking a cake, designing a garden, constructing a table, setting up a pathway infront of a house, talking to a patient or selling a product can be done in many different ways. Only a team with different perspectives can judge together which new development might be attractive to a large audience, because common sense and common perspectives are not easily achieved.

Another core opinion about the foundations for creativity relates to content knowledge and expertise. The more a person knows about a domain, the higher is the potential for creativity (Boden 1994). Donovan and Bransford (2005, 4) coined the term “cognitive constructivism”, which states that “new understandings are constructed on a foundation of existing understandings and experiences”. In the context of VET, students and workplace trainers underestimate to some extent the important role of knowledge, because they reduce it to the practical knowledge derived from the world of work. A solid knowledge base supports the critical role that VET schools play during the years of training. At the same time Ward (2008) argues that deep domain specific knowledge is counterproductive for creative accomplishments. He warns that one should not be too fixed or dogmatic in ones thinking on what is already known, because it could undermine the ability to generate new ideas (Ward, 2008).

Therefore, it will be highly relevant to reconsider didactical approaches used in the past that solely focused on knowledge transmission and its application at the workplace. If creative potential ought to be developed, it requires preparing VET students for working and coping with the “unknown”. What is increasingly required from them is “original thinking”, a composite competence, including several cognitive abilities and personality characteristics, such as independence, self-discipline, attitude
to risk taking, tolerance of ambiguity, perseverance in the face of frustration, and relative concern for social approval (Amabile 1996).

**Didactical methods to support creativity development among VET students**

The literature lists a large number of methods that support creative endeavours and can be taught. Particularly relevant are abilities, such as observing, asking new questions and listen to what has not been said (Brown 2009). An important trait is empathy, which forms a pre-condition for working collaboratively and developing imaginative skills that enhance understanding of each other’s proposals. Tanggaard (2013) claims that students need to be given the time to fool around, a process in which empathy and the skills mentioned above can be developed. “Fooling around” means, that not every action and activity performed will lead to a meaningful process or product, but instead a variety of different pathways are pursued. What follows this endeavour is brainstorming, drafting of ideas and prototyping whatever there is to be developed, an approach promoted by design thinking. Paper or thin metal as well as dough or plaster can be good materials to work with. All these methods serve the visualization of ideas, which helps them to become more realistic. Illustrating something with them creates a collective understanding, because it becomes easier to attach an emotional value to something. While working with various materials is found to be supportive of creative thinking processes, experts recommend limiting the use of digital media.

When looking more closely at the creative process, the literature largely proposes two ways of cognitively approaching it: with divergent and convergent thinking. Guildford (1950) already argued that schools tend to put more emphasis on convergent thinking (problem solving skills, logic, correct answers etc.) while being less concerned with divergent thinking (unusual, lateral thinking that involves seeking out new possibilities). Other important thinking styles mentioned in the literature are visionary thinking, diagnostic thinking, strategic thinking, thinking with ideas, evaluative thinking, contextual thinking and tactic thinking (Puccio et. al. 2007).

In order to develop the creative potential among VET students to shape their work in creative ways pedagogical methods need to be explored and possibly further developed in collaboration with teachers. Creativity-supportive practices include (a) applying activating methods that support creative thinking, (b) providing opportunities for choice and exploration, and (c) encouraging students’ intrinsic motivation by providing them with room to freely express. These methods are a useful toolkit for teachers to start with when redesigning some of their instructional planning.

**Conclusions – Challenges for VET to provide creativity supportive environments**

VET institutions are challenged to strike the balance between providing structure and freedom so that students feel supported and encouraged to take the risks that exploration entails. In addition, the learning environment in vocational schools as much as the learning culture at the workplace need to support creative expression. One highly relevant aspect to take more into consideration is the development of individual personality traits and empathy as well as the preparation for collaborative work. What has not been researched yet in this context is the influence of art as an experience and subject of creative expression that can support character building. Considering that many professions entail an aesthetic dimension that plays a large role in the
development of new products, bringing together students with different backgrounds and different perspectives who can work cooperatively would be an essential experience in preparation for modern workplaces.

Overall, not much is known yet about how to incorporate creativity in everyday teaching in VET and how students learn to be creative at the workplace. A first company visit at the company Swisscom in Switzerland has shown that workplaces are shaped in new ways and provide learning environments and learning strategies related to the support of convergent and divergent thinking processes. In mixed teams workers are collaborating in projects to develop new ideas and products. Obvious is the increasing demand for more flexibility in respect to working styles, working habits, time management and leadership strategies. Working environments are reconstructed to meet and facilitate these requests.

Considering all of the above has implications for the apprentice. Young adults at Swisscom for example apply for projects that last for about six months. They are also included in the development of new products, not least because they are informed consumers, who can bring ideas for new developments. Overall, these workplace changes need to be reflected in vocational education and training. It becomes obvious that creativity development largely builds on what is learned and taught so far and requires a solid knowledge base. In addition, it requires changes in classroom instruction and new didactic considerations.

Literature

Tweaking success:  
A case study on developing a pre-apprenticeship program for at-risk high school students

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Summary- This case covers how four successful registered apprenticeship programs in the Greater St. Louis region jointly addressed—in a proactive manner—the need to recruit, train, and place non-traditional populations in the construction industry in anticipation of the launch of two multi-decade (quasi-public/private) mega-projects. And, more importantly, adjusted the model to address labor supply and demand issues.

Keywords: Pre-apprenticeship, BUD, Building and Construction Trades Council

Introduction
Nearly four years ago, four union leaders were gathered by the executive director (Jeff Aboussie) of the St. Louis Building and Construction Trades Council (BCTC) to discuss the possibility of starting a pre-apprenticeship program to prepare women and minorities for careers in the St. Louis construction industry (Brucks, 2015). With two quasi-public construction consumers committed to spend more than $3 billion over the next two decades, the union trades decided to proactively address the anticipated contractual requirements for supplying qualified “boots-on-the-ground” workers from non-traditional populations to their signatory general contractors bidding the aforementioned work.

A number of the construction trades had partnered on a similar project prior to the Great Recession of 2007-10. In 2006, the Missouri Department of Transportation (MoDOT) through the Federal Highway Administration, sought pre-apprenticeship training providers—willing to assist in addressing the need for supplying more women and minorities on MoDOT projects—for the re-work of a 12-mile stretch of highway in the central corridor connecting the City of St. Louis with St. Louis County (known as I-64). The BCTC, with the help of St. Louis Community College (STLCC), was awarded one of the two training grants by MoDOT (Gaal, 2010).

Methodology
After months of planning and input from various public and private sources, the Building Union Diversity (BUD) program launched its first round of training in September 2014 with a graduation one week prior to Thanksgiving Day. Six trades opened their jointly managed apprenticeship programs to the 12 students who showed up on the first day of program. The first week of this seven-week course covered safety (OSHA-10), math, and other workplace readiness issues as well as daily pep talks from successful African-American men and women who represented labor, management, and owners in the local construction marketplace (Finkelstein, 2014). Each trade hosted and provided one week’s worth of classroom and shop-related training. The trades that participated included: Operating Engineers, Iron Workers, Brick Layers, Electricians, Plumbers & Pipefitters, and Carpenters. Within three months of completion, nine of the 12 graduates were employed within the local
industry. As the BUD program nears its fourth and final round of training for the 2017 program year, cumulatively, it has graduated 90 percent (92 completers of 102 starters) of its enrolled students and placed over 80 percent of its graduates in construction careers (i.e., indentured apprenticeships).

Results
The author was one of the architects of the BUD program and has served as the Director of Training and Workforce Development for the St. Louis-Kansas City Carpenters Regional Council for nearly 15 years. Prior to this assignment, he worked in various roles for the St. Louis Carpenters Joint Apprenticeship Program (CJAP) since 1983. Gaal also served on the Federal Advisory Committee on Apprenticeship from 2003-10 and was an instrumental part of the team that redesigned the current standards of apprenticeship (known as 29CFR29) that were implemented in November 2008. In April 2015, Gaal attended an invitation-only program at The White House that recognized successful programs serving the registered apprenticeship arena. Albeit a short history, the BUD program had already garnered national attention for its graduation and placement rates of at-risk and/or non-traditional populations in the construction industry (Raasch, 2015).

Capacity quickly became an issue with the BUD program. As the US economy started to heat back up, local contractors were being awarded more and more jobs that had workforce participation requirements embedded in the contract documents. However, the Workforce Investment Board linked to the BUD program was not able to supply enough candidates to meet the next round’s class size lower limit (10), much less the upper limit (15). It is equally important for one to consider at least two other significant national issues: 1) The swift loss of institutional knowledge- due to the 2007 Great Recession, a staggering number of construction workers in their mid-50’s took early retirements in order to ensure a steady income; and 2) The graying of America- the average age in many of the trades is approaching 50 (Pittman & Long, 2015). (Notes: 1. Some experts suggest that the K-12 system is partially at fault due to the fact that many comprehensive high schools eliminated wood and metal shop courses decades ago (Wyman, 2017); and 2. The average age of a registered apprentice in the St. Louis region is approximately 28 years old.).

While at the aforementioned White House event in April 2015, Dr. Gaal reported out the findings for his group’s breakout session. As he was on stage, Gaal took the opportunity to request that the then Secretary of Commerce, Penny Pritzker, challenge the Obama Administration to move the discussion beyond expanding apprenticeships merely in a horizontal industry sector manner (i.e., Health Care, IT, Business Services, and Advanced Manufacturing). He suggested that in order to grow apprenticeships to one million by 2019 (a goal proposed by President Obama) the system would need to undertake a vertical approach. After all, the US Department of Education was making inroads with many states’ departments of education with respect to their College and Career Readiness initiatives. Often, it was career and technical education (CTE) that served as the Career Readiness piece of those initiatives. To this end, if the US-DOL’s Office of Apprenticeship sought to quickly grow apprenticeships they needed to identify a captive audience. Gaal proclaimed that it would behoove US-DOL to target high school students across the US as the program he is associated with in St. Louis had done since 2004 with a CTE pathway at Bayless High School (Kreamer & Zimmermann, 2017).

By early 2017, it was becoming clear that in order to keep the concept of BUD alive a new version would need to be developed. This may have been a result of fatigue, for
a lack of better words. Fatigue from the communities striving to recruit qualified candidates as well as fatigue from the trades delivering training to less than full classes and, not to mention, fatigue from contractors hiring BUD graduates who carried “social baggage” (average age of a BUD graduate to this point was approximately 38). The executive director of a proactive construction management association and one of its members approached a local inner-city charity that had a history of working with a couple of the trades. Eventually, representatives from each of these groups requested a meeting with BUD leadership. Within a few months, a high school version of BUD was in the works, known as BUD Lite. Herein, the Demetrious Johnson Charitable Foundation (DJCF) (See http://djcfgivesback.org/) would work with the superintendents of two school districts to recruit second-semester, at-risk 12th-graders for a pilot program. These students would attend one week of blue-collar training (comparable to the week training BUD students were exposed to) at the St. Louis CJAP in March 2017. This portion was followed with a white-collar internship in April 2017. Wherein, each senior was assigned a contractor and for the next four weeks, these students would shadow a project manager four hours per week. Upon high school graduations in May 2017, five of the nine students mentioned above were indentured into various trades’ registered apprenticeship programs (RAPs). It is important to note that all nine were made job offers. However, due to transportation issues, four of the nine were not able to complete the indenturing process immediately following graduation. By July 2017, the DJCF reported that three of these four graduates without transportation were hired (a contractor was awarded a job near a bus line in the inner-city) while one of the four decided to enroll in college. As the BUD Lite program is not intended to solely serve the blue-collar portion of the construction industry, its architects feel it may be better to implement a program in the 11th grade—over the course of the entire school year—thereby providing students more blue- and white-collar exposures. Accordingly, the following proposal awaits approval for the 2017-18 school year:

**Fall semester (Blue-collar)-**
- Last week of September: Carpentry (Residential)
- Last week of October: Floor Laying (Commercial)
- Last week of November: Welding (Industrial)

**Spring semester (White-collar)-**
- Four weeks of February: Jobsite internship (16 hours)
- Four weeks of March: Jobsite internship (16 hours)

This approach will hopefully provide students transitioning from junior to senior year an opportunity to consider college programs in construction/architecture/engineering. Only time will tell!

**Discussion**

As parents, students, and Congress become inundated by news reports of staggering college debt for many graduates who cannot find work related to their degrees and/or at a living wage, career readiness in the form of apprenticeship programs have become more popular (Krupnick, 2017). However, when it comes to offering “apprenticeship” as a viable alternative pathway to college one must be careful in not over-exaggerating its benefits. To this end, upon graduation, a number of recent reports suggest one can earn on average between $55,000 and $60,000 per year (DeLea, 2017; Carnevale et al., 2017). In many cases, where apprenticeship graduates are frequently used to bolster the aforementioned salary range these promoters fail to disclose that a vast majority of these wage earners graduated from
union-affiliated construction-related RAPs. As noted above, what makes programs like BUD and BUD Lite work, is the input from various stakeholders…all playing key roles. Not unlike the world-class apprenticeship models (i.e., Swiss and German), these union-affiliated programs have three common features, when it comes to participatory stakeholders: industry input from the affiliated labor organization, industry input from the affiliated management association, and government oversight (McCray, 2017). Lerman (2017) suggests if the US would take apprenticeship to scale to the likes of Canada, Australia, or England, the total served in the US could approach four million. Accordingly, this author cautions those excited about expanding (scaling up) apprenticeship programs without providing unbiased third-party overview (White House, 2017).

Acknowledgement
Thanks to Jim Duane for his tireless dedication to ensuring the BUD program was built on a solid foundation before departing for his well-deserved retirement from STLCC in late July 2017.

Literature
Using Reflective Online Diary Entry to Enhance Teaching, Learning and Assessment in Online Apprenticeships-Pedagogy Perspective

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Summary: Contemporary teaching practices have led to the development of apprenticeship programmes delivered online. While promoting accessibility, online learning also faces many challenges. This research questions if reflective online dairies can enhance teaching, learning and assessment in the context of an apprenticeship programme delivered online. Adopting an action research methodology, the lecturer reflects on the use of online diaries for 66 first year students in the 2016-2017 academic year as part of a sales module taught on a new online BA (Honours) in Insurance Practice Apprenticeship programme at IT Sligo. The findings suggest that the online diaries helped the lecturer to understand students learning progress and enabled a stronger connection to the students as a direct result of reading the online diaries. They encouraged students to become familiar with reflective writing and fostered deeper engagement between students and the content.

Keywords: online diary, online apprenticeship, reflective writing, online learning

Introduction

Student engagement with their learning is key to a successful learning experience. Ensuring a high level of engagement requires effort on both the student’s part and the institute’s. Lecturers in particular are responsible for using appropriate pedagogy in a suitable manner to enhance the achievement of learning outcomes and the development of students (HEA Academy, 2010). The traditional apprenticeship conducts learning through face to face pedagogy. However contemporary teaching practices now have led to the development of apprenticeship programmes delivered online. This delivery mechanism, while cost efficient and effective, is also believed to promote accessible, convenient and flexible education opportunities for traditional and non-traditional learners (Chau, 2010). But without face to face interaction, online learning faces its own challenges.

This research questions: Can reflective e-diaries enhance teaching, learning and assessment in the context of an apprenticeship programme delivered online? Reflective thinking encourages learners to form a personal response to experiences, situations, events or new information during a ‘processing’ phase where thinking and learning takes place (University of New South Wales, 2016). The use of online diaries, also referred to as e-diaries or e-journals, by learners in online delivery of apprenticeship programmes may allow students to reflect on this learning in a structured and accredited way, whereby they are allocated continuous assessment marks for actively submitting online diaries. Additionally, they may allow for the lecturer...
to gauge their students understanding of theory and content delivered online and to retrospectively adapt the pedagogy and assessment strategy accordingly.

**Literature**

National education policy reports that in the years ahead, students will choose to learn in a variety of ways, full-time or part-time, on campus or off campus, classroom-based, blended, online or accelerated learning (Department of Education and Skills, 2013). This has already commenced, where higher education providers are delivering programmes of learning to students all over the world, resulting in a proliferation in online and blended learning opportunities (Bonk, 2009). Chau (2010) criticises online learning by recognising that some online learners go through the entire online learning experience by themselves. Without any real interaction, they can almost be rendered invisible to their classmates and instructors.

Online diaries have the potential to provide a formal way to credit students for recognising the value of their learning and are an effective way for lecturers to check if students are engaged with content. They can allow for a rapport to be developed between students and lecturers and can prove to be essential for successful interaction in online courses with little face to face engagement (Phipps, 2005).

In addition, reflective writing within the diary has many additional benefits ranging from; supporting independent learning; providing a space for students to locate and order their thoughts; counteracting possible ‘spoon feeding’ associated with handouts or lecture notes and encouraging deep learning and self-assessment (Moon, 2003).

**Methodology**

While research already exists on the use of online diaries in education (Moon, 2003), this research wanted to explore their use in the context of an apprenticeship programme delivered online in Ireland. The researcher adopted an action research methodology, commonly used by educators to gather information about and subsequently improve how they teach and how their students learn (Mills, 2000). Creswell (2002) identifies that action research allows the educator to turn the lens on their own educational practices through a dynamic process which spirals between self-reflection, data collection and action.

The researcher documented their personal and professional reflections based on observations of the online diary submissions, where the direct result has been to plan new pedagogies for improved learning (Samaras, 2011). Creswell (2002) states that an important step in action research is to share ones’ findings to enhance the promotion of change.

The lecturer implemented online diaries for 66 first year students in the 2016-2017 academic year as part of a sales module taught on a new online BA (Honours) in Insurance Practice Apprenticeship programme at IT Sligo. Students were asked to write a weekly 300-word reflective diary entry within Moodle, an online learning platform. The prompts given to students were; What did you learn this week? What changes did you try to make in your role - what worked, what did not and why? What could you have improved on and how? What would you do differently? All parts of this research project adhered to, and complied with, best practice research guidelines.
Results

At the heart of apprenticeships is applied learning. However, this can be difficult to measure if the lecturer does not have face to face contact with students. The online diaries have proved to be an effective way to overcome that hurdle. Apprenticeship students engaged well with the online diaries. While there were some protests from students regarding their frequency, it seemed appropriate to encourage structure and routine early on, particularly for first year students. The lecturer however did not quite anticipate the amount of time required to read and respond to each of the diary entries. With 66 students in the group, the time necessary was grossly underestimated. The intention was to respond to each individual entry every week, however after four weeks it was decided that responses would only be sent to those students who had posed a question or those struggling with the concept reflection within the online diary.

Overcoming Chau's (2010) criticisms of online learning, the lecturer found that by reviewing and responding to the student's diaries, they could recognise learning progress and those students who were not actively engaging with the content. Most students could effectively communicate their understanding of the module with concise examples of how theory applied to their roles within the insurance industry. However, some did not grasp reflective writing and simply wrote a summary of the lecture. When necessary the lecturer responded directly to those students, prompting them to be more reflective and explaining how. These students were followed up on for several weeks until their entries improved.

Assessment strategies such as online diaries, where students gain recognition for their engagement with a module, encourages them to become familiar with reflective writing. In acknowledgement by the lecturer that some students can progress to the final year of a degree programme and still not comprehend reflective writing, pedagogical approaches have been improved to inspire student reflection earlier. Retrospectively, the prompts given to students could have been adapted and refined to the weekly lecture content, thus providing more guidance. In the future, the lecturer plans to customise the questions posed to ensure students benefit completely from the exercise.

The lecturers' personal reflections seemed to materialise subconsciously. During lectures, they could call upon the experience of a student as a direct result of reading the diary entry. This seemed to encourage deeper engagement between students and the content. It also ensured that students were alert during lectures, unknowing if their own experiences would be called upon at any stage. Aligned with Phipps (2005) research, the lecturer also felt that they had a stronger connection to the students as a direct result of the online diaries. With face to face teaching it is inevitable that the educator learns a little bit about each of the students’ backgrounds, this information can then be used to personalise delivery. While not always possible in the online context, the online diaries fostered this connection.

This research served to contribute to academic practices on apprenticeship programmes and the findings suggest that online diaries do in fact enhance teaching, learning and assessment in the context of an apprenticeship programme delivered online. To enhance the online diaries in the future the lecturer has considered adapting them to a portfolio style whereby students can upload and include excerpts relating to their apprenticeship. Putting more onus on the student to relate the content to their
own role may enhance their learning. Consideration is also being given to their frequency, given the workload for both the learner and lecturer.

Literature


Heterogeneity as a Challenge in Assistant Nurse Training – which Support Strategies do Teachers use?

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Summary: This contribution deals with the heterogeneity of trainees in the one- or two-year assistant nurse training in Germany. The question is how teachers at so-called “schools of public health” try to make the trainings successful with respect to trainees with a heterogeneous background. In the focus are different strategies schools and teachers use to cope with the skills shortage, as well as with pedagogical aims for teachers, and the concepts and activities they use to support the trainees. Another issue refers to the wishes and perspectives of teachers towards (official) support structures. The research questions are explored by using interviews with teachers. First, results will be presented.

Keywords: one-year assistant nurse training, heterogeneity, support structures, permeability

Introduction

In the profession of nursing, an increasing skills shortage has been a reality for many years. The one- or two-year assistant nurse training can be seen as one strategy to increase the number of skilled workers in this sector. At the same time, very little is known about the conditions under which the one- or two-year assistant nurse trainings work, and how teachers manage the courses and support the trainees to get a successful completion. The paper gives a short insight into the work of teachers in this area using a qualitative approach.

Strategies against the skills shortage in the care sector

To deal with the skills shortage in the care sector, different strategies can be used. They comprise, among other things, the recruitment of skilled personnel from abroad or the extension of the national workforce. All in all, it is recommended that only a complex bunch of activities is helpful to reduce the skills shortage.

The different strategies are also used in a large official program in the care sector. The “Offensive for Elderly Care Training and Qualifications” was supported by the Federal Government of Germany between 2012 to 2015. It aims to increase the number of skilled personnel in the elderly care training sector, to improve the working conditions of elderly care nurses, and to increase the social appraisal of care work. The offensive so far has caused the number of training places in the elderly care sector to rise by around 10 percent per year (BMFSFJ 2015).

One possible strategy to deal with the skills shortage in the nursing sector lies in the easing and improvement of entry in nurse training (Bertelsmann-Stiftung 2012). Normally applicants who want to start a regular three-year nurse training need the highest school leaving examination. In contrast, applicants who want to enter a one-or-two-year assistant nurse training only need a certificate of secondary education. To increase the number of
skilled personnel in the care sector more and more applicants with lower school leaving certificates shall be attracted into a one- or two-year assistant nurse training. After completion of the training, there is a possibility for a crediting option to a subsequent regular three-year nurse training. The “strategy for more heads” is not uncontroversial because raising permeability includes the risk of reducing quality of training in favour of quantity (Darmann-Finck/Glissmann 2011). Currently around 10 percent of all trainees in nurse training are located in the one- or two-year assistant nurse training (Schier 2016; Zöller 2015) and companies have an increasing interest to employ the graduates.

**Heterogeneity of the target group**

Using this strategy also means dealing with applicants who have a heterogeneous background. Applicants differ, especially regarding age, gender, ethnical background and educational background (Albrecht et. al. 2014). The situation is well known in different areas of VET (Severing 2013), and there also exist official support programmes to deal with this problem. In the period from 2011 to 2014, the Federal Institute for Vocational Training (BiBB) managed the programme “Heterogeneity as a Chance for Skills Shortage”. In 17 pilot projects, different structural and pedagogical concepts have been developed. They focused especially on small and medium-sized enterprises, who have more and more applicants with a heterogeneous background (Ernst et al. 2015). The programme was financed by the Federal Ministry of Education and Research (BMBF). Heterogeneity is also a topic at school. Teachers use different pedagogical strategies to support education for pupils with heterogeneous backgrounds (Bohl et. al. 2017).

**Academic void dealing with assistant nurse trainings**

However, so far, little has been investigated regarding how teachers deal with the increasing heterogeneity of trainees in the (assistant) nurse training courses and which strategies they use to support the success of their trainings. It is well known that trainees in the one- or two-year assistant nurse training have a large heterogeneous background. It is also reported that these teachers need a lot of different competences to deal with demanding working situations (Trompeter 2014; Andreas 2016). But, very little is known about how teachers manage these training courses in a pedagogical and didactical view, and what further challenges they have to face.

**Research Questions**

Against this background, the paper deals with the question of how teachers can manage a successful one-year assistant nurse training with trainees having a strongly heterogeneous background. What are the problems, challenges and chances for teachers when it comes to the realization and arrangement of training measures? The following questions are relevant in this problem context:

1. What kind of challenges exist for teachers supporting trainees with heterogeneous backgrounds (age, educational background, ethnicity)?
2. What pedagogical and didactical approaches to support trainees are used by teachers (for development of competences, professional identity, resilience)?
3. What wishes do schools and teachers have regarding the support of trainees (culture of support at schools, use of external support structures, further education of teachers)?

**Research methodology**

In order to get answers to these research questions, a qualitative research design was developed. The design included qualitative interviews with teachers working at so-called
"schools of public health". Teachers were interviewed regarding their experiences, wishes and support activities in the one-year assistant nurse training. Between July and September 2017, eight to ten schools in two federal states have been/will be visited to carry out interviews. The interviews will be interpreted by using categories and the content analysis according to Mayring (2010). For the interviews, a questionnaire was developed containing three main topics: (1) Strategies used by schools to face the increasing skills shortage in the care sector, (2) concepts of teachers and trainers to support trainees at school and at the workplace, and (3) wishes of teachers with respect to (official) support structures and perspectives of the assistant nurse training.

Preliminary results

The interviews so far have revealed that teachers who are responsible for students in a one-year assistant nurse training course have to deal with complex and demanding tasks influenced by different factors. The interviews also showed that the teachers used very different strategies to support their trainees and to help them reach the aims of the training. In the following, a short overview of preliminary results is presented.

The first part of the interviews dealt with the strategies used by schools to face the increasing skills shortage in the care sector. The answers of the teachers showed that the schools partly used different types of promotion programmes to gain more applicants for their training courses. The teachers also reported that they had to recruit more and more applicants with a heterogeneous background. They also reported a lack of quality in the training of the companies. In their opinion, this was influenced by the skills shortage because of a lack of trainers.

The second part of the interview picked out the concepts of teachers and trainers supporting trainees in school and at the workplace as a central theme. The answers of the teachers were manifold and showed differences in the pedagogical aims and methods they used in their lessons. The teachers also used a wide range of activities to gain their pedagogical aims, as well as different motivation strategies and reflexions to support a successful training course. The differences were influenced by the professional experiences and the attitudes of the teachers.

The third part of the interview referred to wishes of teachers with respect to (official) support structures and perspectives of the assistant nurse training. The teachers showed that they had different ideas regarding possible support structures to make training courses more successful. Some teachers reported their disappointment because of the deficits in the basic conditions, and in the official support structures which did not work to satisfy the needs of their students. They emphasized that much more could be done to support training courses with students with a very heterogeneous background effective.

Some of the results could have been expected. Other results were more unexpected. This can be seen, for example, in the large and impressive engagement some teachers show. This includes even their strong “fight” for their students to gain better conditions for passing the exam successfully. Also, the result that common institutional support structures fail instead of helping special students (e.g. single mothers) with their different needs was unexpected.

The results of our first research steps have already led to further research questions: What pedagogical concepts are especially suitable to support trainees with a heterogeneous background; What role has the familiar atmosphere that some teachers try to build up in their courses; How can the support of trainees and teachers be further improved; How can institutional structures become more sensible against the
heterogeneous group of trainees in the assistant nurse training; Which additional forms of attendance and support are necessary and desirable?

The questions have increasing importance against the background that heterogeneous groups in VET need ongoing support to develop a positive attitude towards lifelong learning, and are able to use the permeability of VET pathways.

**Literature**


Topic 5: Occupational Standards and Assessing Competence
‘Innovative Assessment’ and its implication for apprenticeship

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Summary: This study focuses on how students in the same discipline perceive two different types of assessments. The study compares the perceptions of a cohort of 1st year engineering students in relation to their assessment in a ‘practical skills’ based module, namely Workshop Practice 1 (WP1). Approximately half of these students were ‘traditionally’ assessed with the remainder experiencing a combination of self and co-assessment with their lecturer. Whilst the study explored assessment in 1st year engineering education, it is believed that the findings of the study will also offer a useful point of comparison in relation to how ‘innovative assessment’ might influence teaching and learning in a ‘skills based’ apprenticeship setting.

Keywords: traditional assessment, innovative assessment, self assessment, co-assessment.

Introduction

The education landscape in Ireland is currently going through significant change. Indeed, developments in areas like globalisation, rapid technological advancement and an ever expanding and more diverse student population present significant challenges for educational institutions. One such challenge suggests that ‘traditional’ forms of teaching and learning for apprenticeship training need to be ‘reimagined’ so as to reflect the more complex and ‘transferable’ skill sets required of present day craftspeople (e.g. communication skills, critical thinking skills, learning to take responsibility for one’s own learning etc).

In this context, adapting the manner in which we assess learners (by making the processes involved more transparent and participative) is considered to have an important role to play in terms of its potential to develop such skills. The skills based nature of apprenticeship training and the special working relationship between master craftsman and their apprentices presents significant opportunity for more inclusive and transparent assessment processes.

Traditional Assessment vs. Self & Co-assessment

Workshop Practice 1 (WP1) is a first year undergraduate engineering module delivered in a laboratory setting and has the main aim of developing core practical skills required for engineering programmes offered at the Institute of Technology Blanchardstown (ITB). Currently, students on the WP1 module typically produce/construct a number of artifacts such as circuit boards, computer interface cables and a final ‘mini’ project. Students’ work is traditionally collected as they finish each individual artefact, graded by the lecturer at some other location and is consistent with forms of ‘traditional assessment’ as indicated in the literature (Murphy, 2006). The use of ‘innovative assessment’ in the study sought to change this dynamic by requiring students to self assess their artefact against pre-explained standards and grading criteria. Following this, students were required to co-
assess the artefact with the lecturer. In practice, the student presented the self-assessed artefact to the lecturer who would grade the piece in the presence of the student. The ‘co-assessment’ is the ‘negotiation’ that takes place between student and lecturer during the comparison of self and lecturer assessments in order to ‘agree’ upon the final grade for the artefact. During the ‘negotiation’ phase the lecturer adopts the role of ‘content expert’ while the student/self-assessor attempts to convince the expert (in a process subject to appeal) that his/her conclusions are valid and consistent with the established standards and grading criteria that he/she knew about in advance (McMahon, 1999).

Implicit in deciding to use teaching and learning techniques such as self or co-assessment, is a tutor’s acceptance of sharing, to a greater or lesser extent, the ‘power’ attached to evaluating and judging another person’s work. Traditionally, this was a unilateral exercise, performed by the tutor, yet it is with sharing this ‘power’ that we can empower learners to become more confident about their learning as a whole (Brown, Race & Rust in P. Knight et al. 1995). Furthermore, involving students in assessment has the potential to help them understand the nature of complex professional judgement, grasp the required standards of their discipline and better recognise their own levels of achievement (Ball et al. 2012). Significantly, Heron (1998) suggests that adopting teaching and learning approaches which tend to exclude students from the assessment process can negatively affect learning because it makes the student feel inadequate and undermines their confidence. In this context, assessment has the potential to influence the students’ experience of education. Given that assessment is currently in the spotlight for its poor ratings in student satisfaction surveys and ‘underperformance’ in quality reviews (Price, Carroll, O’Donovan, & Rust 2011), the more that we can engage students in assessment activities meaningful to them and which contribute to their learning, the more satisfying will be their experience of education (Bryan & Clegg 2006).

Methodology

A case study strives to portray ‘what it is like’ to be in a particular situation, to catch the close-up reality and ‘thick description’ of participants’ lived experiences of, thoughts about and feelings for, a particular situation (Geertz 1973). As this study sought to analyse complex phenomena such as different students’ perspectives, a case study approach involving mixed methods was deemed most suitable.

The ‘case’ being studied in this research involved gathering and analysing data from 98 1st year engineering students during 2015/2016 in relation to their experience of assessment/summative assessment in the WP1 module. Five groups of students completed the WP1 module in semester 1 and four groups in semester 2. For comparison purposes, a total of four groups participated in self and co-assessment (two in semester 1 and two in semester 2), while a total of five student groups were traditionally assessed (three in semester 1 and two in semester 2). Overall, 57 students were traditionally assessed with 41 students co-assessed (98 students in total). The mixed methods approach utilised an online questionnaire survey (Google forms) as a source of quantitative data (56 students participated) and focus group meetings to gather qualitative data (32 students participated). Two focus group meetings were held in semester 1 (one traditional assessment group & one co-assessed group) with two focus group meetings held in semester 2 (one traditional & one co-assessed group).

The rationale for adopting such an approach was to attain a more balanced and nuanced interpretation of the phenomenon being examined. Indeed, using such an approach was an attempt to “explain more fully, the richness and complexity of human
behaviour by studying it from more than one standpoint and, in so doing, by making use of both quantitative and qualitative data” (Cohen et al. 2007, p.195).

Given that the researcher in this study was also one of the lecturers delivering the WP1 module, another important reason for choosing a mixed methods research design was to help minimise potential researcher bias. As Lin (1976) asserts, “Exclusive reliance on one method may bias or distort the researcher’s picture of the particular slice of reality she is investigating” (p.195). Therefore the researcher sought to establish patterns and themes across traditionally assessed and co-assessed students at the survey stage followed by ‘converging evidence’ i.e. ‘triangulation’, from the subsequent focus group stage. This approach agrees with the notation of ‘sequential mixed designs’ where one or other of quantitative and qualitative methods run one after the other (Teddlie and Tashakkori, 2006).

**Data Analysis**

The data collection for this study was gathered via both quantitative (online questionnaire) and qualitative (focus group) instruments. Therefore, the researcher’s analysis of the data required both quantitative and qualitative techniques. Moreover, given that this study sought to explore the student experience of assessment between differently assessed groups, a quantitative data analysis technique which could facilitate a ‘difference test’ was necessary. According to Cohen et al. (2007) ‘Difference testing’ is an important feature in understanding data. Hence, the ‘chi-squared test of independence’ as recommended by Hamilton (2006) which is based on the notion of results being statistically significant (in terms of the difference between them) emerged as a good fit for analysing the quantitative data.

The second stage of data analysis involved looking at the data gathered during focus group sessions. Sapsford et al. (2006) describe data collected via transcripts of audio recordings (such as focus groups) as ‘unstructured data’. In other words, the data “are not already coded in terms of the researcher’s analytical categories” (p.243). With this in mind, the researcher transcribed and analysed the focus group data utilising ‘open coding’ as recommended by Cohen et al. (2007). This enabled the researcher to identify common themes and patterns in question responses across all student groups. These findings were then grouped into categories according to the most relevant research questions. The final analysis involved cross-checking the analysed quantitative and qualitative data, looking for common or contradictory themes and patterns across both sources of analysed data.

**Results**

This study found a notable disparity between traditionally and co-assessed student groups in relation to their perceptions of ‘inclusion in assessment’, ‘clarity of assessment criteria’ and ‘student satisfaction levels with their assessment’. Within these areas in particular, it was co-assessed students who indicated a significantly more positive and engaged experience with their assessment. It’s important to note that the disparities between traditionally and co-assessed student groups in these areas are not based on diametrically opposed perspectives. On the contrary, test results which established ‘statistically significant differences’ were invariably the results of differences in the ‘strength of feelings’ (e.g. strongly agree vs. agree) between traditionally and co-assessed students (in terms of individual statements within the survey). That is to say, while traditionally and co-assessed groups tended to ‘agree’ on statements put to them in the survey, the strength of that agreement varied significantly. Hence, quantitative data
Analysis established a statistically significant relationship between how student groups were assessed, i.e. traditional or co-assessment, and their responses to the student assessment survey. Moreover, findings from follow-up focus group meetings served to offer more detailed evidence which suggests co-assessment had positively influenced the student experience with assessment within these areas. Overall, the outcomes of this research suggest that co-assessment has had a significantly positive impact on teaching and learning in the WP1 module.

**Literature**


E-Assessments To Support Apprentices Learning At Work

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Summary: In 2011, New Zealand's (NZ) qualification system moved from the accumulation of atomised 'unit standards' to the attainment of holistic outcomes based on graduate profiles (Chan, 2016). In so doing, the role of assessments for learning (i.e. formative assessments informing learning progression and attainment) became more important than assessments of learning (i.e. summative assessments leading to a grade or statement of competency). This article reports on several sub-projects, relevant to apprenticeship learning, which are part of a larger study to construct guidelines for the deployment of e-assessments for learning.

Keywords: e-assessments; assessments for learning; workplace learning;

Introduction

Assessments for learning provide learners progressive feedback as they learn skills, apply knowledge and attain attributes as described in graduate profile outcome requirements (Shepard, 2005). Digital tools, appropriately deployed to encourage learning, provide opportunities for effective assessment of learning (Gikandi, Morrow, & Davis, 2011). The guidelines developed are to inform the provision of effective multiliteracies-based e-assessments for learning across level 1 to 6 (i.e. pre-degree and apprenticeship) programmes (Chan et al., 2017). The research team teach across 4 institutes of technology or polytechnics (ITPs) in New Zealand. Five relevant sub-projects, their rationale and research method are reported. Interim findings are proposed.

Rationale

In this article, e-assessments are defined as “the use of information technology in the design, delivery and administration of assessment activities, including the reporting, storing and transferring of assessment data (Stowell & Lamshed, 2011) p 3)”. Generally, the contemporary literature on the development and implementation of e-assessments have been within the compulsory schooling and higher education contexts (Gikandi et al., 2011). Additionally, these educational sectors have focused e-assessment development on assessments of learning, with strong emphasis on text-based assessment methodologies, aspects of assessment authenticity, prevention of plagiarism and topics centred around information technology system security and infrastructure stability (Gikandi et al., 2011). Hence, the findings from the project, make contributions to the deployment of e-assessments for learning pertinent to the wider education sector.

The project adopts the precepts that learning through apprenticeship encompasses learning to do, think, feel and be a trades person (Chan, 2013a). Apprentices engaged in workplace learning, learn to become and be trades people (Chan, 2013b). The sub-projects reported, go beyond supporting the learning of trade knowledge and skills. Each sub-project has a focus on assisting learners to learn aspects of the trade which may not be readily visible (Gamble, 2001) or have the language to describe (Marchand, 2007). Learners require support...
to understand the messages and feedback not only from their teachers, trainers and peers, but to also be attuned to significant feedback from the tools, machinery, materials, digital interfaces (i.e. learning analytics) and environments (i.e. the socio-material (Fenwick, 2010)) in which work is undertaken.

**Literature**

*The importance of feedback for learning*

Learners’ ability to gauge how much they already know and what they need to do to progress learning, is the best indicator contributing towards learner performance (Hattie, 2009). Effective assessments for learning, provide learners with the feedback required to modify or improve their learning approaches (Hattie & Timperley, 2007). Selected and used appropriately, e-assessment for learning approaches provide opportunities for a range of learner-friendly feedback (Pachler, Daly, Mor, & Mellor, 2009) which enable learners to progress learning.

Shifting to digital assessments of learning offer many advantages. These include the ability to capture authentic multimodal learning; the provision of synchronous feedback from trainers situated geographically distant from the learner; and the archival of learning evidence for feedback from peers, employers and trainers and for collation into e-portfolios. However, there are also challenges with deploying digital tools to support assessments for learning. These revolve around aspects of accessibility to digital tools and digital infrastructure to allow for mobile just-in-time access; digital literacy of teachers, employers and learners; and aspects of assessment validity and reliability (Chan, Fisher, & Sauer, 2014).

**Research Question**

The project derives guidelines for the effective implementation of e-assessments for learning through an analysis of the innovative deployment of e-assessment approaches. All the sub-projects have objectives to improve learners’ learning through some form of technology enhanced e-assessment. Hence, this paper reports on the research question: How can e-assessments for learning be best deployed to assist with vocational learning?

**Research Method**

The participative action research (PAR) variant of spirals of inquiry (Timperley, Halbert, & Kaser, 2014) was utilised through each sub-project to refine the innovative e-assessment processes. Through PAR, various challenges deploying each form of e-assessment were identified and resolved. Data collected by each sub-project included surveys, interviews or focus groups with students and surveys or focus groups with teachers. Multimodal examples of student work were collected to establish student engagement and learning and evaluate the efficacy of using digital tools for learning support. The sub-project researchers kept reflective journals. All data from each sub-project were collated into case studies. Anchored on network theories of learning (Gros, 2015), these cases were thematically analysed individually and comparatively to uncover commonalities and dissimilarities. The pedagogical values which underpin networked learning were used to frame data analysis. The precepts of networked learning are collaborative learning approaches including opportunities for discussion and dialogue; the need for learners’ self-determination of the learning process; trust and relationships between learners and others; and the role of technology in supporting, connecting and mediating processes ((Hodgson, McConnell, & Dirckinck-Holmfeld, 2012).

*E-assessments for vocational learning*
The project began in February 2017. By July 2017, data from the first PAR iterations were collated and analysed. Assessments for learning within the sub-projects featured in this article were developed to assist novices with the following:

- The development of problem solving skills with aeronautical engineers, using note-taking platforms;
- Support of workplace based learning for quantity surveyors using note-taking platforms;
- Use of a series of apps to improve learners' ability to articulate 'how to taste like a chef';
- Virtual reality to help carpenters improve their sense of spatial perception on building sites and virtual reality welding for automotive engineering students.

Findings

Within network-theory, the inter-relationships between learners, technology, teachers and learning outcomes become the focus. The following are interim themes:

Themes

1) Teacher motivation and efficacy is required due to the complexities of bringing together assessment for learning outcomes, effective ways to engage learners and the logistical affordances of technology.
2) The formative learning focus of e-assessments must be made overt to learners.
3) Learners' familiarity with technology, allow for the maximization of feedback from peers, teachers, workplace mentors and the sociomaterial aspects of work.
4) Technologies are envisaged as enablers to collaborative learning between teachers, learners, peers and the sociomaterial. In particular, technology is the bridge connecting learners to teachers or practice experts and the conduit by which feedback and learners' responses to feedback can be checked, reflected upon and exchanged.

Conclusion

This article reports on several projects, pertinent to apprenticeship on how e-assessments for learning have been used to support vocational learning. Collated themes for supporting the development and deployment of e-assessments are presented, evaluated and discussed.

Literature


Competence measurement and development in South Africa: Exploring the determinants heterogeneity

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Summary: The South African COMET project over the period 2011 to 2016 has tested just over 1,400 apprentices across four different occupations at 17 different test sites. Analysis of results thus far reveals high level of “learner diversity” or heterogeneity, indicating a learning time difference for apprentices of as much as two years between learning groups or classes. This paper aims to raise an awareness of heterogeneity with particular reference to a developing economy. It also examines some of the explicit and implicit determinants attributable to such a result which could inform teaching strategies.

Keywords: COMET, vocational competence development, heterogeneity, diversity.

Introduction

Skills development is critical to South Africa’s developmental challenge. The visionary legacy of Nelson Mandela has left an obsession around his mantra “As long as poverty, injustice and gross inequality persist in our world, none of us can truly rest”. It is against this background of diversity in an economy that raises unique challenges within the quality development of TVET teaching, learning and assessment. The South African COMET project has been identified as a suitable large scale diagnostic instrument, capable of analysing and improving the performance of the TVET system in South Africa.

The particular phenomenon related to the economic and social diversity is the heterogeneity of measured competence between learning groups. This has recently been raised by the conclusion of a COMET study from 2013 to 2016 (Hauschildt, 2016). “The results show a large difference in the performance of learners between classes with evidence that there is also a large difference in the performance of learners within a single class” with emphasis on “dramatic divergence” and “huge differences”. This finding is not unique to developing economies. Rauner (Rauner, Peining, 2014) confirms that “heterogeneity of competences and competence development is particularly high in vocational education and training courses” in general – and that the major reason is the wide range of the educational background of the trainees, referring to high school apprentices not intending to enter university studies and those who prefer to “learn a real job before I get into the jungle of new and higher level study courses”.

The pre-vocational education background in the South African public schools context presents low achievement levels in basic education with “low quality education up until grade 11 regarded as the root cause of low attainment beyond grade 11” (van der Berg, et al, 2011). Entrance requirements for public TVET Colleges are set at a minimum attainment of a grade 9. This post school environment sets the scene for this research assignment.
Methods and research design

The information generated by three large-scale competence diagnostic (LS-CD) test series has been used to generate data for heterogeneity calculations. More than 1,400 learners participated in the COMET test series in 2014, 2015 and 2016. Tests were developed for the occupations of welder, electrician, mechatronic and motor mechanic over 17 different test sites. Sixty-one subject matter experts were involved in test development and rating of test solutions - and a correlation of 0.8 was achieved in the reliability of scoring between tests. Both private and public colleges/academies participated through their students and 53% of these institutions were from the public TVET College sector.

Quantitative analysis included COMET test scores, test supervisor comments, results of vocational identity and commitment questionnaire completed by test participants and the results of interviews held with teachers or trainers of the various test groups.

Calculations to present a diagram depicting the degree heterogeneity have been used as the foundation to explore the determinants of this phenomenon.

Results

A: Heterogeneity measured.

A difference in learning years between learners at the same learning venue is measured to be as much as two years (figure 1).

![Graph showing heterogeneity of competence at different South African learning venues](Hauschildt, 2016, p. 14)

Figure 1: Heterogeneity diagram of selected South African COMET test sites 2014 and 2015 (Hauschildt, 2016, p. 14) * The extreme value in welding refers to a sample of only 10 test takers, the extreme value in mechatronics refers to a venue incl. two extraordinarily well performing learners that led to a higher average score (1)
Additionally, the best results of the weakest test site measured in average COMET test scores, may not reach the average score of another test site (Figure 2)

![Figure 2: Percentiles of test results according to test sites. COMET test 2014 South Africa (based on Hauschildt, 2016)](image)

**B: Determinants of heterogeneity defined.**

Further analysis of the determinants of heterogeneity in the 2014, 2015 and 2016 COMET test series are presented as follows:

1. Introduction of work process learning strategies decreases the number of risk learners, thereby decreasing heterogeneity and raising competence levels by as much as 30% over a learning group within an eighteen month period.

Additional research completed in 2014 and 2016 is presented below (figure 3)

<table>
<thead>
<tr>
<th>LONGITUDINAL ANALYSIS OF COMPETENCE DEVELOPMENT</th>
</tr>
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<tbody>
<tr>
<td>(with work process learning strategy introduced from 2014)</td>
</tr>
<tr>
<td><strong>Overall result WL 2014 – West Coast College</strong></td>
</tr>
</tbody>
</table>
Number of test participants = 98; Average competence score = 20.28
Number of test participants = 35; Average competence score = 29.18

2. **Institution type** also plays a significant role in explaining the degree of heterogeneity between test sites, with 71% of public colleges mean test results falling below the average of all participating test sites. Different degrees of heterogeneity are also documented in Figure 2: test sites 1, 5 and 6 are private companies, whereas the results of test sites 7, 9, 10, and 11 represent learners' performances at public colleges. The public colleges have a large proportion of learners/apprentices not linked to workplace experience and reflected learning practices, thus further substantiating the importance of work process learning. Moreover, public colleges also have a minimum entrance requirement of Grade 9 to vocational programmes, where private colleges and company owned academies use Grade 12 as an entrance requirement.

3. **Teacher competence in occupations taught.** During the 2014 and 2015 COMET test series, teachers were asked to participate in the same tests completed by their
students. Results of these tests emphasised heterogeneity of teacher competence in the occupation taught (Figure 4). This result suggests that teacher development through professional association or further studies specialising in TVET teaching and learning are not adequately supported.

<table>
<thead>
<tr>
<th>Competence profiles of teachers and trainers – result of top 5</th>
<th>Competence profiles of teachers and trainers – result of median 4</th>
<th>Competence profiles of teachers and trainers – result of bottom 5</th>
</tr>
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<tbody>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
<td><img src="image3.png" alt="Diagram" /></td>
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**Figure 4: Results of teachers participating in the COMET test of 2014**

4. The percentage of risk learners amongst female test takers across 2014 and 2015 was much higher, thus indicating gender as a determinant of heterogeneity (Hauschildt 2016).

![Distribution of male female test takers in absolute numbers and according to selected competence levels COMET South Africa and 2015.](image4.png)

**General sample sizes in this study suggest that deeper investigations into these determinants should be included future research projects.**

**Literature**

Hauschildt, U., 2016, COMET South Africa: Final Report and Documentation of Test Results. University of Bremen I:BB.


Work-process oriented content of VET – a concept facing the Development of Industry 4.0?

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Summary:
The report reflects the effects of the Industry Internet of Things for the didactical work of VET-Teachers. The typical didactical strategy to identify core-work processes with best-case-work-processes as content of the vocational Education seems no longer available. Industry 4.0 will not know the one “best-case”, it only know the process of optimization. Therefore, Vocational Education must focus itself to the mathematic methods of describing and developing the (production) environment. Looking to these results, the future questions must be how to define new content, new cases and an adapted teacher-education for this development.

Keywords: Industry 4.0, Industry Internet of Things, Vocational Science, Vocational Didactic, TVET

Preliminary Note

The term “Industry 4.0” was created by the European (and special German Industry) to remark a new process of automatization.

In their idea, Industry 1.0 was the first step of automatization by human force or steam (loom), Industry 2.0 was the organization of work in chord-systems by using assembly-line production, Industry 3.0 was the first automatization of human work by using PLC and Robotic-Technology and Industry 4.0 means the using of cyber-physical systems to steer the whole value chain.

The term will be also use to characterize the new tasks working in this Industry (“Work 4.0”) and the social consequences of this development (“Society 4.0”). In core, all these different terms means what is calling “Industrial Internet of Things” in Anglo-American.

Introduction

The possibilities of the technology of the Internet, to collect a lot of Data from several sources (“Big Data”), to analyse these data and to generate automatically decisions contains the chance to reorganize Industrial Production. Because by using these data, it is possible to plan the production directly to the customer wish, to order the material “just in time” and to manage, that every machine (steered by computer numbered technology) will run with their highest efficiency. In this world of labour, human work will no longer done by hand and qualification will be no longer the possibility, to steer a production process by hand. Skilled worker in this changed working environment must be able,
• to adapt the cyber-physical system of production to the reality of the market (what products with what material must we produce in what time with what price and benefit for the company?) and
• to solve problems of steering the machines, formulating new rules for the production in cases of unforeseen and to increase competitiveness.

So general spoken, skilled work in Industry 4.0 is characterized by the task of algorithming for understanding the environment (Analysing of Big data) and designing the environment (Steering the value chain). So skilled work will not base on optimal work-processes learned during the vocational Education or Training. The skilled work will be the creation of these processes. So the new didactical question seems an old one: How must VET be organized to develop the competence of design. The new aspect: How can VET teach, to transfer the design-based solution in an Algorithm.

Methodology
To understand, what is really new in the labour world of “Industry 4.0” and what are the consequences for VET, there was done a first inventory by
1. formulating typical models of the “Industry Internet of Things”-concept and
2. describing the typical VET in Vocational colleges based on the idea of “Learning fields” with German vocational curricula, which are using the “Action-Competence” for “design your live inside and outside of labour” (KMK 2011).

The aim of this inventory will be, to understand the content of labour work in this new labour environment and to ask, if the actual quality of VET will be able to prepare the vocational students for this new world of employment.

A special problem in this moment is, that there are a lot of concepts and idea, how a cyber-physical production can be manage, will be described – but there are only a small numbers of companies, which will chance their production. Therefore, it was only possible, to visit one big player and two SME to find out general lines for the new labour work. These results will be added with a study running in Austria (supported by TVD as German Partner), which will creating the model later called as “shared Industry” as main future organisation-structure.

To understand the reality of VET in the Vocational colleges, it was realize an analysis of state-of-the-art training-concepts coming from young teachers in preparation-courses. In both cases, the common results will reflected with experts (for the first topic coming from the industry, for the second topic coming from the Vocational schools/-VET-Administration).

Results

Typical Industrial 4.0-Organization

Analysing the Data of the Company-visits and reflecting them with experts, following (Think-) models can characterized:
Model “Classical Development”:
Using this model, an industrial company change their steering-process from human generated to expert system generated. All machines will have a connection among themselves and it exists data about the customer orders, the material storage and the storage for the products. So the system will be decide, which machine will produce what and will order the material before and will handle the Logistic-Process including Quality Control after producing. Therefore, three types of workers will be created: Type “Controller”, who ca calculate the production costs and will create offers to the customers,
the “IT-Supporter”, which can optimize and modify the expert-system including machine-diagnostic and production-data and the “Mechatronic”, which can repair the machines in case of fault. In this scenario, “Controller” and “IT-Supporter” have highly paid jobs; the “Mechatronic” in most cases without the task of diagnostic will have a low paid job.

Model “Shared Industry”:
The “shared Industry” model based on a model coming from the Japanese automotive Industry in the 1970 er years and means, that many small factories will build only one or two piece of the product. Only the “master-company” has a full overview about the production and will assemble the product. Adapting this model in the Industry 4.0-world, it means, that many One-Man-Enterprises will be connected by an expert system, which is steering the offer-market, the production plans and the logistic as platform for these small enterprises (SE). Each SE must be member of several platforms. Looking to this model, it is in this moment unknown (, if you need a high-end-qualified Entrepreneur, which will be able to handle between his production, his own expert system to pick up orders and his own expert system for an efficient production. A second variant the model based on the idea of a low-qualified worker, which is only the assistant of the production, which will be steered by the expert system completely from outside. Last inquiries for this model show, that a high-qualified “crowd-worker” is more probably then a low-qualified worker, which will only react (Hirsch-Kreinsen/Itterman 2017).

Typical VET-Organization:
The observed VET-Courses shows, that the model of the “holistic action-process” typical a work-task as didactical base dominated. There was no case of “design-orientation” (Rauner et.al. 2012), in which students must create new solutions based on analysing the special environment reaching the Level of Expert (also in courses for ”Technican/Supervisor-Qualification”). The experts approved this result.

Resume
Looking to the explained changes in the Industry 4.0, following conclusions seems be possible:

1. The most named scenario is speaking, that the new labour-world in the industry needs a small number of low-qualified workers (working in a pre-defined Human-Robotic-Collaboration, Jeske/Terstegen 2015) and a low number off very high-qualified worker as member of a lean management (Stowasser 2014).
2. But the competitive ability of a company and the National Economy of a country is addicted to the apprenticeship of the high-qualified worker, which are often called “engineer workers”. They must be able to optimize the whole supply-chain, they must realize trouble-shooting in short time and they must be able to decide about strategies and equipment. Therefore, the question is: How can we design VET for these future workers.
3. The analysis of the actual VET in Germany shows, that the curriculum-structure of “learning-fields” will be used – but in the direction of action-oriented and not in the direction of design-oriented. The main task of such VET is not, to design a new solution but to re-invent a well-known work-process as ideal-solution. However, looking to the tasks of high-qualified Industry 4.0-working, it is unable, to formulate a best case solution. So what will be the aim in this process of apprenticeship?
4. A second problem: The idea of Vocational Science means, that it is able to name core-work-processes as basic elements of VET-Curricula. In this moment, we know that in Industry 4.0 are two general fields: Optimization and Trouble-shooting. An in different to this model of Vocational Science, every Industry 4.0-
Company has grown up his special layers along the supply-chain with very individual networking. And this individual solutions are the core of the competitive-ability with the result, that a standard solution (as didactical base) with a well-known and well-analysed work-process (as aim of Vocational Training) are no longer the cornerstones in the didactical work of the Vocational Teachers.

5. In the same moment, a new case or challenge for VET will be grown up: One general characteristic of each high-qualified work in Industry 4.0 is the description of in-moment or future reality by using mathematic methods. In simple cases, it is able to use Boolean algebra for processes of production-steering, but in the field of generating decisions techniques of Artificial Intelligence like fuzzy-logic algorithm or neural networks will be used. So looking to the European MINT-(Mathematics, Informatics, Nature-Science and Technic) or Anglo-American STEM-Initiative (Science, Technology, Engineering, Mathematics) one common didactical moment can be defined: A vocational-based mathematic, which give the students methods and procedures, to understand the actual industrial environment as main part of analyse and to modify solutions in a simulation environment. This can be the “new core” of vocational education behind several work-processes. The generalistic way in the new work-processes of optimization and troubleshooting.

6. The last questions for the future in VET as factor for the national economy: Is Vocational Didactic able
   a. to create this form of mathematics as learning-topic,
   b. to adapt the instruments of vocational science for defining learning-situations for these procedures and
   c. to train VET-Teachers for this challenge of “developing real design competence”?

**Literature**


KMK – Sekretariat der ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland, Erklärung der Kultusministerkonferenz für eine zukunftsorientierte Gestaltung der dualen Berufsausbildung (Beschluss der Kultusministerkonferenz vom 09.12.2010).


Trends and Patterns Across Countries
Topic 6: Trends and Patterns Across Countries
France, a holistic approach of apprenticeship

Eric Dumartin
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Summary: With a high level of youth unemployment (25%), France considers building a large apprenticeship system a key challenge. Past initiatives to develop apprenticeship programs had a very low or negative impact. The situation is complex and the solution is based on the capacity to combine various key success factors and stakeholders at the same time, like for some medical therapies. As past experience shows, solutions taken individually and without joint, concerted efforts have limitations or inefficiencies. After the simplification effort made by the government around apprenticeship modalities, regions and tax collectors are the new key players to align companies’ needs and schools’ offerings, while the major remaining challenge will be to reform the national education prism.

Apprenticeship, a national issue
All the candidates to the recent French Presidential election included apprenticeship development into their programs. But, the details of their analysis and proposals showed a very different understanding of what all consider a key solution to deal with the incredibly high unemployment rate of youth in France (25%).

A shared responsibility and no real ownership
Apprenticeships have stagnated with only 5.2 % of youth following apprenticeship courses. Notwithstanding a 2012 target of 500,000 youth in apprenticeship, actual apprenticeships have still reached only 419,500 youth in February 2017. The responsibility for this stagnation is shared. The government reduced subsidies in 2014 and increased the system’s complexity. Companies have not wanted to to invest time and money in young people. Schools have content and a calendar of school courses that don’t fit with company needs. And the trainees themselves with have a 25% abandonment rate. Some of those criticisms are true but most of them are based on past realities. For two years now, progress has been made and at this critical stage for the future of apprenticeship, it is a good moment to consider the role and benefits of each stakeholder. We come to a point where the consciousness of the situation and the diagnostics are shared and where we are probably coming to a holistic solution.

Apprenticeship in France: a lot of constraints and efforts
With 272,315 entries in apprenticeship, France is far from the estimated level of 500,000 apprenticeship entries required to deal with youth unemployment. From remaining constant, apprenticeship numbers declined in 2014 after the government decision to minimize the subsidies linked to the recruitment of apprentice. The direct relation between subsidies and apprenticeship is demonstrated in France. From that date
the government has realized the mistake and has raised funding. But subsidies are not a motivational factor, they just avoid disaffection of firms.

The lowest qualification apprenticeships have declined from 78% to 42% of registered contracts in 10 years' time. Over the same period, jobs unfilled for lack of qualified young people (on the lowest qualifications) are estimated at 500,000. The highest apprenticeship qualifications increased from 5.8% to 34%. Some see these trends as a distortion of the apprenticeship objective to offer an opportunity to disadvantaged populations. The enlargement of apprenticeship to the highest diploma is an easy solution to “hit” the numbers; apprenticeship have become a great opportunity to finance expensive studies.

While learning evolves with the most graduates, it still appears strongly as a way of rapid relegation (from 16-17 years) for young people who have "dropped out" of the system. Learning is polarized at both ends of the qualification levels. On the other hand, it remains weakly developed at the level of the vocational baccalaureate and non-existent at the level of post-secondary non-higher education, where company’s needs are. In France, there has been a kind of social contempt towards manual and industrial trades. Apprenticeship is mainly practiced in very small businesses, in relatively low-paid occupations, whose professional prospects are often poor (weakness of continuing vocational training) and most often without any intention of hiring at the end. Once the apprenticeship contract has been signed, the problem of confidence between apprentices and employers is also reflected in the figures on contract breaks: Low-skilled jobs preparing for lower-skilled occupations have the highest rate of contract breaks: for example, they account for 48.9% in the hotel and restaurant sector. More worryingly, the breakdown of the apprenticeship contract results in almost 80% of the cases a complete cessation of apprenticeship.

Stakeholders mapping: the successful combination?

Not less than 9 stakeholders interact with the apprenticeship system: the national government, the regions, the national education system, the schools, the tax collectors (OCTA), the professional branches, the companies, the apprentices and their families. They do their best and sometimes they do very well, but they work separately. With so many stakeholders in the French apprenticeship system it is tempting to put a weight on their individual impact on the system efficiency with a sequential approach.

Is apprenticeship a systemic process or a chain where each step should be successful? Today, most of these stakeholders have only 3 interactions with the rest of the actors. Whatever the answer is, with 9 stakeholders, there is no need to demonstrate the importance of coordination and clarification. We examine what are the best practices and the drawbacks of the main stakeholders and propose some cooperation schemes to leverage their efficiency.

The Government

The Government must avoid complexity. The creation of new contracts for youth ("contrat d’avenir") instead of focusing on apprenticeship had a very low effect (120,000 contracts, 1,3 billion €, 51% insertion rate/70% for apprenticeship). Enlarging the eligible population just to hit the numbers for political reasons does not answer company needs. The complex and moving subsidies, tax exemptions, apprenticeship tax system should be simplified and the national government must just put a financial accelerator on "on demand" sectors and on low qualification apprenticeships. More than anything the
national government should drive the national education system’s strategy regarding apprenticeship. We see this is THE challenge.

Two initiatives are moving in a good direction: the merger of all alternation systems in 2018 and an internet portal providing online simulator and assistant for apprentices and companies www.alternance.emploi.gouv.fr. While simplifying the system, the national government must develop consistency by controlling national education and regional apprenticeship strategies.

The Regions
Strong inequalities exist between regions. Since the decentralization laws of 1983, the 13 regions are the leaders in apprenticeship policy. The problem is the landscape varies widely, according to the budget choices of the localities. For example, 40% of apprentices are trained in 4 regions. The number of apprentices in the second-cycle enrollment ranges from 19% in Nord-Pas-de-Calais to 36% in Corsica, for a national average of 26.1%. These disparities make the elaboration of an effective national policy very complex.

But encouraging initiatives are expanding: there is a deeper coordination with OCTA to focus their efforts on professional branches with manpower needs and an improvement of transparency in funding schools. Still today, there is little or no real feedback to OCTA. Some regions have also expanded conditions of access to apprenticeship (until the age of 30) and list schools they believe are answering local manpower issues.

The OCTA:
Replacing more than 200 intermediaries since 2017, 19 OCTA collect the companies’ apprenticeship tax and after negotiation with the branch (each OCTA is managing apprenticeship funds for some defined professional sectors) they send the money to the Regions for the schools they have targeted. OCTA’s role is key, not only because it distributes the money, but also because it anticipates branch needs. Regional school offerings should result from a permanent dialogue with regions. OCTA must become the pivot point of “professional world” stakeholders in apprenticeship system.

The professional branches
The main critique is wide gap between competency needs and what is taught by schools. Aligning needs and offerings is one of the major objectives of professional branches. In France, more than 700 branches are designing specific trainings that fit with their manpower requirements. This work also means participation in school boards. But one of the difficulties is geographic distance: how can one attract youth from long distances if only one school is delivering your programs? And if you need a lot of apprentices, how can one deliver the same program across the country?

The National Education (NE)
NE is clearly a hindrance to success of apprenticeship. Far from employment reality, the focus is on their diplomas. NE does not send a positive image of apprenticeship. At orientation, the choices students hear is the same line, “repeating the class or apprenticeship”, portraying a negative message sent to families. If youth have failed in their studies, there is an unconscious reflex to push the responsibility on them and not on the educational system that can’t blame itself. In this case, apprenticeship is presented
as a “no solution” and we must not be surprised of the high abandonment rate. But that’s not all… Many apprenticeship schools have been attached to classic high schools that have privileged boarding schools for their “noble courses”. As a consequence, apprentices have to choose a speciality close to their parent’s home. NE has also decided to rename most apprenticeship specialities to avoid names in relation with a professional activity, creating confusion. The programs focus on general education and not specific learnings.

**National Education should not try to treat apprenticeship like classic learning.**

**The schools**

Schools are just starting to coordinate learning periods with work in the companies. Schools have also improved their offerings. Initially only CFA (Apprenticeship Training Centers) were authorized to deliver apprenticeship training. Now, more and more schools are. Since August 2016, the professional certificates from the Work Minister have enlarged the list of eligible trainings. Enlargement of apprenticeship offer is a key success factor. Cooperation between professional branches via OCTA, schools and Region have become essential. Another key challenge is to improve housing offerings for apprentices.

Developing pedagogy is the last challenge: Apprenticeship has been for too long synonymous of traditional teaching based on the NE model. It must dust off its teaching model to answer the expectations of a new generation and company needs. Changing the image of apprenticeship must also start by implementing alternative learning strategies, like “on the job training”, and learning by project which is very adequate to apprenticeship needs.

Fortunately, many remarkable initiatives are demonstrating that “it works”. One example is “Compagnons du Devoir”, which mixes traditional initial pathways with digital learning. Another is the now famous “Second Chance Schools”.

**Other stakeholders**

While companies should be blamed for not recruiting enough apprentices, the fact that companies don’t appear in the key stakeholders list sounds amazing. Still, companies are not the main brake to apprenticeship. They need resources but if the system is too complex or inadequate they will look for another solution. In the new landscape described above they must participate actively in their branch activity and have OCTA as a partner and not just as a tax collector.

On the other side of this apprenticeship spectrum we have the “users”, the youth but also their family. Why the family? Because in 40% of cases, the family network is finding and convincing the company that will welcome an apprentice!

**Conclusion**

Most actors, except probably NE, have taken steps to performance create performance and simplify the system. Now, instead of creating connections between all of them we must focus on 3 key players to make it globally efficient: OCTA for the “business” side, regions for employment efficiency, and schools for an attractive pedagogy. The national government, after simplifying successfully the system should just remain active to reform national education’s role and then become the referee with a focus on the interest of apprentices.
Literature
Cécile Crouzel, “François Hollande has failed to relaunch apprenticeship”, Le Figaro, April 2017
Camille Wong, “some apprenticeship sectors are more neglected than others”, Le Figaro, June 2017
Manon Lalhère, “the world apprenticeship network GAN is arriving in France”, Le Figaro, June 2017
France apprenticeship plan: http://www.gouvernement.fr/action/le-plan-relance-apprentissage
Ambassadors of apprenticeship (FACE) http://travailemploi.gouv.fr/IMG/pdf/dossier_ambassadeur
Successful Apprenticeships: Observations from an Australian study

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Summary: Self-directed learning highlights the importance of learning collaboratively within supportive learning environments. Conceptually, this scholarship situates self-directed learning as elevated from the historical discourse surrounding technical and non-technical competence. This paper explores how a sample of apprentices, working and learning within the Australian building and construction industry, developed as competent and self-directed tradespeople. This achievement was evidenced by the apprentices not only meeting the minimum occupational standards, but also having developed high levels of discretionary learning. Using the research methodology of constructivist grounded theory, a number of influential factors were identified which contributed to an individual committing effort to a trade career. These factors were underpinned by the sponsorship of a more experienced “other” who has both a personal and professional interest in the apprentice’s development.

Keywords: self-directed learning, apprenticeship, sponsorship, constructivist grounded theory

Introduction

This paper disseminates some observations after studying a number of successful apprenticeships within the Australian building and construction industry. The apprentices who participated in the study were employed by a group training organisation which operates within the geographic region of the Australian Capital Territory (Canberra).

It is proposed that apprenticeships are successful at the tentative completion of the learning journey, when the apprentice has developed from a novice to a competent and self-directed tradesperson, who has acquired a full sense of vocational identity. This learning journey is tentative in the sense that as apprentices become self-directed they develop (or reaffirm) the predisposition for life long learning in new workplace environments and contexts.

This paper identifies several factors that contribute to successful apprenticeships. These factors include: *the influence of family and friends*, *past experiences with work*, *high expectancy of completion*; and the underpinning *sponsorship* of a more experienced “other” who has both a professional and personal interest in the apprentice’s development.

Discussion

Self-directed learning was chosen as a guiding principle for this study, as it has been extensively considered in the adult education literature, and characterises the importance of learning collaboratively through networks, critical friends (Brookfield, 2013), and supportive workplace learning environments (Fuller & Unwin, 2011). Through
synthesising the broad literature about self-directed learning (including - Knowles, 1975; Cranton, 2006; Hiemstra and Brockett, 2012) in this research, I adopted self-directed learning as being situated at an elevated level to the technical or non-technical notion of competence. This means that as apprentices become tradespersons who are self-directed they not only meet the minimum occupational standards (competence), but also develop high-levels of discretion in their learning, greater autonomy and responsibility, and enhanced capacity for reflection (especially critical reflection). Thus, demonstrating a broader conceptualisation of expertise.

The motivation to focus on the development of tradespeople recognises the importance of a quality apprenticeship being balanced between the emancipatory and economic imperatives of contemporary vocational education and training (VET).

Competency based training (CBT) has been a feature of the Australian VET landscape since its introduction in the late 1980’s as part of a broader strategy of economic reforms. CBT has remained a core component and is currently defined as the “consistent application of knowledge and skill to the standard of work performance required in the workplace. It embodies the ability to transfer and apply knowledge to new situations and environments” (National Quality Council, 2009 p.6).

The implementation of CBT in Australia supported the shift away from a provider-driven system to the current industry focused system. Industry now enjoys significant influence in determining the skill needs of the Australian workforce against a socio-economic backdrop. Ideologically, the previous provider-driven approach centred on holistic development of the individual and, as a consequence of this industry leadership, technical skill outcomes receive priority ahead of the cognitive process of learning (Pearce, 2015).

Group training organisations (GTOs) seem to be a uniquely Australian organisational model and represent a large network of apprentices. GTOs act as intermediaries to directly recruit, engage and administer apprentices. GTOs are generally not-for-profit organisations and play a key role in the skills development in small and medium enterprises (SMEs) (Group Training Australia, 2012).

The enterprises within this study are engaged in building, extending and renovating residential homes to a maximum of two stories, and the fit-out of open plan commercial premises. At the time the enterprises varied in size with the smallest having three full time employees, the largest with 12 employees. All of the enterprises in the study used the same GTO as an intermediary.

Methodology

This paper is part of a larger dissertation (Pearce, 2015) that utilised constructivist grounded theory as the research methodology (Charmaz, 2006), which invoked a social constructivist and interpretative lens for the data collection and theory development. Data was collected using semi-structured interviews with questions guided by the literature.

The participants, totaling 13 males, were purposefully selected by the GTO and included five stage three apprentices, their respective host employers and vocational teachers; all of which had 'served' a formal apprenticeship within the building and construction industry. The apprentices were in stage three of their apprenticeship (typically third year of a four year apprenticeship), and were under 25 years of age. In this traditional model of apprenticeship, the apprentices received training in their respective workplaces (on-the-job) and attended the same vocational institute one day a week throughout the semester (off-the-job). Females were under represented in this study as no female participants were accessible.
Consistent with the research methodology, data was collected and analysed simultaneously, and the saturation of key themes informed the development of the substantive theory. This theory of how apprentices develop as self-directed and competent tradespeople, which builds generalisations from observations of the empirical phenomenon of learning in apprenticeships, is substantive in nature. The extended theory consists of two interrelated aspects being: the identification of a decision-making process was referenced on the apprentice’s evaluation of their experiences as a learner, including the navigation of a number of developmental milestones or stages; and, the positive evaluation of these experiences was enabled through the apprentice’s sponsor. This paper is concerned with the first developmental stage of committing effort.

Results

Before the apprentice was exposed to the learning opportunities that active sponsorship presented within the workplace, the prospective apprentice had to make an initial decision to expend energy to seek and secure an apprenticeship from an employer.

Interestingly, it surfaced that prospective employers prioritised non-technical attributes such as punctuality, effective communication, and the willingness to accept direction and learn over pre-existing technical or trade skills and knowledge. Colloquially, the employers were seeking apprentices who were ‘prepared to have a go and do their best’. Employers were looking for apprentices who were ‘trade ready’. There was evidence to suggest a connection between this trade readiness and the level or authenticity of apprentices’ commitment.

The factors of committing effort that contributed to the success of apprenticeships are positive and enabling, were developed before the apprentice decided to seek an apprenticeship, and were maintained throughout the apprenticeship, including the influence of family and friends, past experiences with work, and high expectancy of completion. These factors were underpinned by the notion of sponsorship from a more experienced “other” who concerned themselves with the apprentice’s development.

Influences of family and friends

This study revealed that the decision of the apprentice to seek and maintain engagement with their trade apprenticeship was influenced by their family and friends and the value that family and friends place on vocational education and training opportunities as a worthwhile occupational choice. As one apprentice commented “I always had support for my brother being a bricklayer and he got me in it by doing a few weekend jobs”.

Past experiences with work

In addition to the influence of family and friends, the decision to seek an apprenticeship and trade career was also influenced by the apprentice’s past work experiences. These experiences were said to include prior work experience, either voluntary, part-time, full-time employment and work experience initiatives at secondary school. An apprentice shared he decided to seek an apprenticeship as he found that he was unemployeable, in a similar position to work in his home country, without a trade qualification.

High expectancy of completion

It was revealed that the influence of others and prior work experiences impacts on the apprentices determination of the value of the apprenticeship. It was found that the apprentices were also influenced by their belief that completion of a trade qualification
was not only valuable, but also achievable – within their reach – with an expectancy of completion.

The apprentices’ responses indicated that self-efficacy and high expectancy of completion impacted the apprentice’s belief that a trade qualification was the right fit for their personal and professional aims and ambitions.

Sponsorship

As the apprentice entered the workforce, the sponsor or sponsors emerged to a position where they used their influence to create a safe learning environment around the apprentice. Promoting the importance of sponsorship to the other stakeholders who have an interest in the development of apprentices, such as colleagues, employers, workplace supervisors and the apprentice’s peers. This acknowledges that an apprenticeship is foremost about learning, and the management of this learning environment is critical as a suitable learning context does not present itself by coincidence. Additionally, the sponsor serves as a knowledgeable and creditable resource to assist the apprentice in normalising their expectations throughout their apprenticeship. It was also likely that an apprentice may have multiple sponsors as their learning journey progresses.

Conclusion

For an apprenticeship to be successful, apprentices must develop and maintain high levels of commitment through reflecting and reconciling internal and external stimuli. Effective sponsors assist this construct as they are able to manage the learning context in a manner where the apprentice felt safe to ask questions, make mistakes, develop expertise and eventually accept responsibility, be autonomous and solve complex problems. Indeed the apprentices became tradespeople who were not only competent but were true self-directed learners.

This research may be of interest to those who are engaged with apprenticeship learning within VET and professional education more broadly.

Literature


Challenges of the School-to-Work Transition and Youth Employment in Kosovo

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Summary: Kosovo has the youngest population in Europe with 38% of its population under the age of 19 years old, which puts pressure on both the education system and the labour market. The unemployment rate in Kosovo is about 30%, and even worse for those ages 15-24. No structured links exist between vocational schools and the local economic environment; educational profiles on offer are determined without any assessment either of labour market demand or employability needs. About 98% of Kosova business companies consist of micro, small, and medium sized enterprises which are particularly keen on recruiting family members and relatives irrespective of their qualification profile. However, there are some sectors with potential for growth of youth employment where employers have difficulty filling vacancies, such as vegetable production. Employers complain about skills deficiency of school entrants; the school system does not equip students with skills and qualifications to perform the job which creates a difficult school to work transition. Students doing practical training are sometimes used as a cheap labour force.

Keywords: youth employment, practical training, skill deficiency, school to work transition, labour market demand, employability needs

The emerging economy in Kosovo

There are formidable challenges ahead for the private sector in Kosovo; starting to work towards overcoming these challenges should be regarded as a matter of national urgency. Young people in Kosovo are now seeking to escape unemployment. They are leaving by the tens of thousands, making their way illegally into European Union countries to look for a better future.

Only the private sector possesses the capabilities to reduce the unemployment rate, especially the youth unemployment rate, in a sustainable and systemic manner, and to set the Kosovo economy on a course of real growth by increasing manufacturing and reducing the very high dependency on imported goods.

Many of the businesses are underdeveloped because of internal reasons: the company owners possess limited business knowledge and experience; the predominate management style is conductive only to very small business operations; the lack of appreciation for the benefits of professional human resource development; the general negative disposition toward learning; and the tendency to favor low risk “me-too” business ideas.

However, there are some pockets of success in industries such as processed food, vegetable products, machinery and electrical equipment, and plastic and rubber products, which have all increased their exports in recent years.
The education system in Kosovo

The current Kosovo Education Strategic Plan (KESP) 2011-2016 links education policy to national development priorities, recognizing the need for the education and training systems to be more responsive to labor market needs and emphasizing the need for broader learning opportunities, including opportunities for the professional practice of Vocational Education and Training (VET) students in enterprises.

VET secondary schools in Kosovo offer two main types of work-based learning programs – work-based learning in VET schools’ workshops, and professional practice in enterprises. While the Ministry of Education Science and Technology (MEST) offers the opportunity for collaboration between schools and enterprises, and in 2013 launched a Strategy for Improving Practical Training 2013-2020, there is still no inter-ministerial agreement that facilitates this collaboration and private sector involvement in policy, curriculum and training design. Students’ insurance issues are a concern for both the VET school and the employer in a professional practice situation. Insurance concerns generally arise over injuries to student work participants.

From the figures below, it can be seen that some occupations are in high demand in the labour market, such are technicians and professional occupations, and there is a high demand for tertiary and vocational education while there is a surplus of workers with general secondary education or only basic education. Regarding occupations, there is a lack of machine operators and technicians in the labour market, while occupations such as sales services or clerks are in excess supply.

![Education Levels in Excess Supply](image1)

![Occupations in Excess Supply](image2)

Career guidance services

There are newly established career guidance centers throughout Kosovo offering career services to support students’ transition from school to work. A career center in the municipality of Pristina offers specialized services on finding practical in-company training, and training on job searching skills for students of vocational schools in Pristina.

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2 World Bank, 2014, Public Finance Review
There is another career center in a VET school in the small town of Vushtrri which serves a similar function, finding practical training for the school’s students. Higher Education institutions are obliged to have career centers in order to be accredited by the Accreditation Agency, but not all of them are well functioning. The career centers support university graduates on a better and faster transition into employment. Also, there are different active employment measures supported by donors and government which support unemployed young people through an easy school to work transition, such as internships for young university graduates, in-company training, public work, and wage subsidy schemes. The career services are particularly relevant and important in Kosovo as patterns of employment and professions in the labor market are still gender specific, and women’s career paths are set by societal stereotypes of women’s roles in the family.

**Interviews with students and employers**

Interviews were undertaken with students and former students about their impressions of the practical training in-company; one found employment after practical training while another is still doing an internship.

One of the students stated, “It was a small team, family members, and not very well-established business, hygiene items production company. The family members were not qualified to do the job nor [did they have] additional training, but were employed because [the] owner would not trust other people to employ in his company. I proposed to improve marketing and my proposal was approved; I developed up to date leaflets, brushers, etc. I knew from the beginning that I have no chance to be employed there, [the] business owner will not employ anybody which is not family member, but I got some work experience which helped me to find a job in another company a few months after finishing practical work”.

Another student working for one of the financial banks in Kosovo, stated “I am doing an internship for almost a year and have responsibility of a full-time employee. It is a very good experience for me, but I think [I] am misused by [the] company as a cheap labor force because I am doing work of the full-time employee and still paid as an intern. The owner of a medium sized company working on vegetable production (potato cultivation) was having difficulty finding employees, even though the monthly wage was twice the minimum salary in Kosovo and he provided two meals a day. He stated: “We are on the high season of the work but cannot find workers, nobody wants to work even though I am offering a good working environment. They want to work in an office or factory and nobody wants to work out in the field. It is not true that youth unemployment is high but youngsters are not willing to work. Coffee bars are full of young people during the day since they are not willing to work”.

Another small private business in dentistry complained about VET student’s practical and soft skills. He stated: “Our Company is taking for practical training students from VET schools. In the company is appointed a person to mentor and supervise them during their practical work on the company and at the end of the practical training the best performed students are employed. School system does not prepare students with skills for job; students luck basic practical skills as well as soft skills, such as communication with clients, team work, taking decision, working under pressure, etc.”
Conclusions

Practical training needs to be taken more seriously by providing all VET and higher education students opportunities for practical work, and by implementing the strategy for improving practical training by establishing criteria and incentives for host enterprises, establishing agreements to be signed between VET schools and host enterprises, and updating health and safety insurance regulations for VET.

It is very important to increase the awareness of employers about their engagement on VET policy development. Schools should prepare a training plan with learning outcomes to be achieved while students are doing their practical work, and supervise them on a continuous basis.

VET profiles should be reviewed according to the local labor market demands, and new curricula should be designed based on occupation standards and with the involvement of the employers and their advice about needed skills for students. Career guidance services should be offered to all school students from an early age and to the unemployed as well.

The government of Kosovo should better monitor active employment measures to avoid employer misuse in order to reduce the unemployment rate among youth and help young people transition to the labor market.

Literature

Ministry of Education Science and Technology (MEST), 2013-Strategy for improvement of professional practice in Kosovo 2013 – 2020
Serhati and Gashi 2013-ETF Mapping of VET educational policies and practices for social inclusion and social cohesion in Kosovo
European Training Foundation (ETF), 2008-Transition from education to work in EU neighboring countries, Turin
Engaging Employer
VET Research in Switzerland –
How does Swiss VET research funding help to stabilize the apprenticeship system?

Silke Fischer, Phillip Gonon

Summary: Since 2004 the State Secretary for Education, Research and Innovation (SERI) has supported a ten-year-program of Vocational Education and Training (VET) research in Switzerland with 28 million Swiss francs. This new established funding had some effects on Swiss VET research. A new set of research and researchers emerged. Furthermore, the program helped to make the apprenticeship model more visible in and outside of Switzerland. The paper’s focus is on the effects of this funding strategy from a rather practical perspective of VET stakeholders.

Keywords: VET research, research funding, national research funding strategy, Switzerland

1. Introduction

For a long time in Switzerland, VET research was seen as needless. The apprenticeship system seemed to work well and had a high reputation amongst all partners, preventing further explorations. Plus, in the scientific community VET research was not regarded as a worthwhile activity. Not surprisingly, very few researchers dealt with questions in the field of VET. Furthermore, these research questions were often explored unsystematically and incompletely (EVD & BBT, 2007, p. 5ff.). Above that a national research coordination with the associated centers was missing and, thus, a critical mass of VET researchers did not exist in Switzerland (Botschaft zu einem neuen Bundesgesetz über die Berufsbildung, 2000, p. 5733).

With the commencement of the new Federal Vocational and Professional Education and Training Act in 2004, the Swiss confederation committed to strengthening the VET system also through research in order to overcome aforementioned problems. The overall declared aim was to support Swiss VET research until a permanent infrastructure on an international acknowledged scientific level was established (Federal Vocational and Professional Education and Training Act, article 4, 1; VET Regulation, article 2, 1.). On a long-term basis the Swiss VET funding should be transferred into the existing national structures of research funding (VET Regulation, article 2, 2).

As a consequence, the Swiss confederation supported VET research from 2004 until 2013 with 28 million Swiss francs in so-called Leading Houses and Individual Projects. Against this background after around 10 years of funding with this strategy, the justifiable question arises whether the investment of the Swiss confederation was helpful in establishing internationally recognized VET research and if this research is validated as important by practitioners. Above that – from a rather practical perspective (e.g., the perspective of VET stakeholders) – it seems to be interesting how Swiss VET funding stabilizes the apprenticeship system in general. The basis of massively
extending research means was also laid in the expectation that more research in the field of apprenticeships would support improving the apprenticeship system and making it more prominent in and outside the country.

2. VET Research Funding in Switzerland

Since 2004, Swiss VET research has been funded by the SERI as VET research is believed to be not competitive enough to scrap over funding with other, rather traditional research disciplines in the national research funding strategy. The Swiss national research strategy consists of funding through the Swiss National Science Foundation (SNF) and the Commission for Technology and Innovation (CTI). As outlined before, as soon as a permanent research infrastructure on an international acknowledged scientific level is established, Swiss VET research should be funded by these two institutions.

This objective is achieved when the following three sub-objectives are fulfilled (SERI, 2014b, p. 1):

- **Establishing lasting VET research in Switzerland:**
  VET research should be recognized as an attractive research discipline with a critical mass of VET researchers and international recognition.

- **Evidence-based VET politics:**
  Scientific data should be generated for a better support of VET policy.

- **Development of VET:**
  The research results should be used by stakeholders in practice.

The SERI established two instruments to achieve the overall set objective. The first one are the **Leading Houses** which should do research on core questions of VET, like economy and governance, technology, quality and didactics in VET, commercial VET and other issues. These rather huge instruments that are selected through competitive assessment chosen by international experts are located at university chairs which coordinate the diverse research projects within the single **Leading House**. **Leading Houses** are seen as competence networks in a special area of VET which should establish themselves on an international scientific level. They have a basic as well as a practice-oriented research approach. Plus, each **Leading House** is supported by the specialized knowledge of an international advisory board which reports the ongoing research work and results to the SERI (SERI, 2016, p. 14). Currently, four **Leading Houses** are active in Switzerland (Zurich, Berne, Lausanne and St. Gallen).

The second instrument are the **Individual Projects**. Here, limited but innovative research projects that are not addressed by **Leading Houses** are examined. These projects can be tendered by the SERI or applied for by individual researchers. Since 2004, 24 **Individual Projects** were promoted by the SERI (SERI, 2016, p. 62 et seg.).

**Methodology**

This abstract bases upon a partial study of the evaluation of Swiss VET research funding which was carried out by a private research company (econcept) and the Chair
for VET and Teacher Training of the University of Zurich in spring/summer 2014. The study was initiated by the SERI which had to fulfil the task of being evaluated after a ten-year-funds-period. As evaluation design of this partial study, a triangulation of methods consisting of qualitative expert interviews and a document analysis were chosen.

Therefore, the study can be divided into the following two parts:

Survey of external persons and peer group:
In order to get as many different perspectives as possible with regard to the Swiss funding strategy in general as well as to impact and outcome of it, six national and international peers (professors) from the areas of Economics of Education, Business and Economic Education and Educational Science, three members of Swiss University Boards of Directors and three members of foundations who fund research were interviewed.

Survey of international experts and country comparative research:
Through a comparative perspective potential for optimization for the future funding strategy of Swiss VET research were revealed. For this 12 European education experts (professors, research assistants, project managers, departmental heads and political consultants) were interviewed. Additionally, the funding strategy of VET research of Austria, Germany, The Netherlands and Denmark were analyzed and compared to the Swiss funding strategy of VET research.

Results

The results of this study show that the Swiss VET funding strategy of the SERI has gained some first positive effects. There have never been before so many researchers who engaged in VET in Switzerland (Fitzli et al. 2015, p. 17). Nevertheless, the lasting of the VET research funding is not secured when the SERI would withdraw its support strategy yet. The affiliated Leading Houses could not anchor themselves at the universities.

VET research is still seen as a relatively young research discipline in Switzerland, which, however, needs some protection and should not be transferred into the existing national structures of research funding yet. The reasons for this are that the profile of many VET projects in general and the rather practical orientation of them do not fit to the funding strategy of the SNF. In sum, it can be deduced that at present it is very difficult for VET research to compete with other disciplines for national research funding.

Through the funding of the SERI, many researchers became active in the field of VET and some projects gained recognition on an international level. But according to the interviewees a critical mass of VET researchers could not been established so far. In the opinion of the interviewees one of the reasons for this is that many researchers from other disciplines apply for research projects in VET due to the SERI funding and return to their original discipline as soon as the funding ends. According to them, a long-term establishment of VET research at universities with the corresponding faculty and chairs is only possible when they are involved in education, too. For that, university
chairs e.g. for business and economic education are to be established. Another reason mentioned was that occupational perspectives for doctoral candidates and postdocs are missing by the established instruments (Fitzli et al., 2015, p. 13). So, many young researchers leave VET and science completely or continue their career in other, rather traditional research disciplines when their funding expires.

From a practical perspective the supported VET research helped only indirectly to stabilize the apprenticeship system in Switzerland. Much research output is not perceived by the relevant VET stakeholders (vocational schools, companies and politics) at all. Most of the results are used isolated by teachers and/or teacher training institutions whereas practitioners and politicians use the results only very little. The reasons for the insufficient valorization of research results are manifold and listed below:

One interpretative attempt for this is the thematic selection of the supported research projects by the SERI which are in terms of contents too far away from the interests of VET practitioners and politicians. Regarding subject matter the Leading Houses are dominated by business and economic education and educational economics. Plus, contrary to the initial objective of the SERI funding, politics are not the most important addressees of the results of the Leading Houses. The sub-objective of evidence-based VET was seen critically by the interviewees as it was judged being a rather political objective and not a research-oriented one. Again, there is a tension between general insights about the VET system on the one hand and practical needs, like the recruitment of young apprentices and/or the handling of youngsters with learning shortcomings, on the other hand.

A further explanation for ignoring Leading House results in educational practice is that the training of VET teachers and trainers is located outside the universities. Therefore, the transfer of research results into practice is more difficult and – if at all – also time-consuming. In addition to that, not all of the research results are suitable for a direct use in practice but have to be tested further in pilot projects (Fitzli et al, 2015, p. 15). There are also no transfer products, like teaching aids, which support the use of results in educational practice.

Altogether the VET research funding has contributed to a better European perception of Swiss research activities in VET. The funding activities of the SERI are regarded as a role model for other countries by foreign experts. The interviewees certified Swiss VET research a high quality and had the impression that Swiss VET research has become more coordinated through the funding strategy of the SERI. However, if the Swiss VET research funding is really helping to stabilize the apprenticeship system in Switzerland cannot be answered yet. But at least politics, public and practitioners are equipped with more reliable, evidence-based knowledge and, thus, are better-informed about VET than ever before. For future steps in supporting VET, evidence-based research is an important factor.

Literature


Bern: BBT.


Influences of Occupational Status and Workplace Training on Vocational Students’ Occupational Identity: a Chinese Context

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Summary: Occupation status, perception of workplace training and occupational identity are measured with 724 Chinese Vocational students by qualified instruments. Results of the structural equation model indicate that occupational status and workplace training all influence students occupational identity, while the quality of workplace training has greater influence compared with occupational status, which challenges conventional Chinese views on occupational status and illustrates the importance of workplace training. Furthermore, as the result of regression model, “Expert Culture”, “Match of tasks with competence”, “Task Complexity” and “Autonomy”, regarding the quality of workplace training, predicts the variation of vocational students’ occupational identity.

Keywords: Occupational Status; Workplace Training; Occupational Identity; Chinese Context

Introduction

Occupational identity is defined as the identification with an occupational field or affiliation to a social or professional group from the perspective of Social Identity Theory, which provides a through description of the context in which personal identities develop and shows how context and identities relate to one another (Reader, 2008). Actually, students’ occupational identity formation begins during vocational education and training (Virtanen et al, 2008), and offers a sustainable source of intrinsic motivation that directs and secures individual engagement with the occupation (Rauner, 1999). Occupational status and workplace training are investigated to shed light on how these contextual factors influence vocational students’ occupational identity within a Chinese context.

Occupational status is a generic term, covering prestige and socioeconomic status, and reflecting the occupational structure of the respective society (Ganzeboom & Treiman, 1996). In China, differentiations among various social hierarchies are significant. Occupational status which indicates social stratification plays an influential role in occupation selection and occupational identity development (Qiu, 2001). An occupation with high status tends to be positively identified and vice versa.

Workplace that provides individuals with practical chances and real work environment is regarded to be beneficial to vocational learning and occupational identity development (Kirpal, 2006; Klotz et al, 2014). Nevertheless, from the pedagogical point of view, workplace itself does not directly have the learning potential and factors in the workplace should be systematically designed so as to promote the development of occupational identity. These include the involvement into expert culture, measures facilitating the transparency of one’s own work and the interrelations to the work of others, task variety, task complexity, match of tasks and vocational competence, autonomy to fulfill tasks (Zimmermann et al, 1999).
Methodology

1. Participants

724 students majoring in vehicle maintenance are surveyed, of whom, 692 (95.9%) are male and 31 (4.4%) are female, fundamentally in line with the sex distribution of this major. The valid rate is 100%. They have just finished the second year of vocational education. The first year is school-based and workplace training is arranged along with school-based learning in the second year.

2. Instruments and Measures

5-point Likert scales developed in the KOMET project on the base of “International Socio-Economic Index of Occupation Status”, “Mannheimer Inventar zur Erfassung betrieblicher Ausbildungssituationen” are used to measure occupational status, students perception of workplace training and occupational identity. The Cronbach $\alpha$ coefficients of the 8 subscales range from 0.62 (with 3 items) to 0.89, which are statistically acceptable.

Results and Discussion

1. Structural relations of Occupational Status, Workplace Training and Occupational Identity
The structural equation model set on the base of theoretical framework fits well with the data (as shown in Table 1), indicating the following results:

**Table 1** Indicators of Model Fit

<table>
<thead>
<tr>
<th></th>
<th>$\chi^2$</th>
<th>df</th>
<th>$\chi^2$/df</th>
<th>Sig</th>
<th>CFI</th>
<th>TLI</th>
<th>RMSEA</th>
<th>SRMR</th>
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<tr>
<td>Standards for Model Fit</td>
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<tr>
<td>Results</td>
<td>1087.10</td>
<td>551</td>
<td>1.92</td>
<td>.00</td>
<td>.920</td>
<td>.913</td>
<td>.039</td>
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</table>

The structural equation model set on the base of theoretical framework fits well with the data (as shown in Table 1), indicating the following results:
(1) Occupational status influence occupational identity significantly with a path coefficient of .143. Comparatively Higher occupational status will positively predict higher occupational identity. As in China, occupation with high status for individuals is not only sources of satisfaction psychologically, but also sources of self-affirmation with regard to social value (Zhang, 2005).

(2) Students’ perception of the quality of workplace training with 6 factors as a whole influences occupational identity significantly with a high path coefficient of .674. The quality of activities and interaction in the workplace influence extensively individual’s identification with the occupation and participation into the community of practice as well as the affiliation to an occupational group (Billet & Somerville, 2004; Baruch & Cohen, 2007).

(3) The quality of workplace training has a major influence on occupational identity, compared with occupational status, which confirms the importance of workplace training in regards to its effects on occupational identity development. More interesting, this finding challenges the conventional Chinese views of the decisive role that occupational status plays on individual’s occupational identity. In the circumstance that graduates of vocational education mainly step into the secondary labor market and occupies with relatively low status, well-designed workplace training could overcome the limitations and positively influence vocational students’ occupational identity to a large extent.

2. Further Regression Results about Factors of Workplace Training on Occupational Identity

<table>
<thead>
<tr>
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<th>Beta</th>
<th>t</th>
<th>Sig</th>
<th>Partial</th>
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<tbody>
<tr>
<td>Expert Culture</td>
<td>.116</td>
<td>2.786</td>
<td>.005</td>
<td>.109</td>
</tr>
<tr>
<td>Transparency</td>
<td>.057</td>
<td>1.345</td>
<td>.179</td>
<td>.053</td>
</tr>
<tr>
<td>Task Variety</td>
<td>.066</td>
<td>.142</td>
<td>.887</td>
<td>.006</td>
</tr>
<tr>
<td>Match of Tasks with Competence</td>
<td>.161</td>
<td>3.933</td>
<td>.000</td>
<td>.153</td>
</tr>
<tr>
<td>Task Complexity</td>
<td>.253</td>
<td>6.035</td>
<td>.000</td>
<td>.232</td>
</tr>
<tr>
<td>Autonomy</td>
<td>.141</td>
<td>3.765</td>
<td>.000</td>
<td>.147</td>
</tr>
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</table>

$R^2_{adjul}= .294$

Regression model illustrates that, factors of workplace training are able to explain 29.4% of the variation of students’ occupational identity, which reconfirms the influential role of workplace training on occupational identity.

(1) “Expert Culture”, “Match of tasks with competence”, “Task Complexity” and “Autonomy”, as indicators of the quality of workplace training, have significant influences on vocational students’ occupational identity.

This confirms the value of supportive experts and their guidance on vocational students’ participation into specific community of practice and their identification of certain occupation (Lave & Wenger, 1991; Heinz, 2008; Newton et al, 2009; Rausch & Schley, 2011).

In accordance with empirical evidences of Zoelch (2008), Heinemann and Rauner (2008), the autonomy to fulfill work tasks as well as match of task demands and students’ vocational competence allowing for the utilization of competence promote positive identification with the occupation.

Among the 4 factors significantly influencing occupation identity, when controlling others, “Task Complexity” alone has the highest partial regression coefficient of .253, which indicates that the more complicated task situation, the higher demands on information collection, planning, implementation and evaluation are, the higher identification with the occupation forms.

(2) Measures facilitating the transparency of one’s own work and the interrelations to the work of others support to deepen vocational students’ understanding of their work and its value and significance, which ought to promote the development of occupational identity (Heinemman & Rauner, 2008). Though the current research fails to verify this theoretical postulation as well as
the influential role of “Task Variety”, their effect should not be ignored. Possible reasons for the non-significant influences could be that the sample students in this research go through workplace training lack of task variety and measures facilitating transparency, with the comparative lower average score of “Transparency”(M=14.80 out of 20) and “Task Variety”(M=11.03 out of 15). Repetitive work tasks are verified empirically to restrict the learning potential of workplace (Fuller & Unwin, 2011).

Conclusion and Recommendations

Occupational status and workplace training influence vocational students’ occupational identity, while the quality of workplace training has greater influence compared with occupational status. This illustrates the importance of workplace training, and meanwhile challenges the conventional Chinese views of the decisive role that occupational status plays on individual’s occupational identity. In the circumstance that graduates of vocational education mainly step into the secondary labor market and occupies with relatively low status, well-designed workplace training could overcome the limitations and positively influence vocational students’ occupational identity to a large extent.

Furthermore, factors regarding the quality of workplace training, such as “Expert Culture”, “Match of tasks with competence”, “Task Complexity” and “Autonomy”, have significant positive influences on vocational students’ occupational identity. “Transparency” and “Task Variety” ought to but fail to influence occupational identity in this study. Possible reasons could be that workplace training for the sample students is lack of task variety and measures facilitating transparency.

Workplace Training should take into account the variety of tasks and measures for transparency. How to systematically design workplace training so as to promote the development of vocational students’ occupational identity might be explored in further research.

Literature


meisterschaft. Zeitschrift für Berufs- und Pädagogik, 95(3), 424-446.
Summary: A robust, highly valued apprenticeship system requires many elements. For the apprenticeship model to compete with alternative approaches to preparing workers for careers, employers and the public must have confidence in the quality of skills that apprentices learn and apply. This paper examines the system for assessing apprentices in Germany, a country where apprenticeships have a well-recognized reputation for quality. After providing a brief overview of the German apprenticeship system, we discuss the skill standards used in the training and assessment of apprentices. Next, we describe the approach used to assess apprentices, its strengths and limitations. We conclude with a discussion of the implications for the U.S. apprenticeship system.

Keywords: Apprenticeships, assessment, trainers

Introduction

A robust, highly valued apprenticeship system requires many elements. For the apprenticeship model to compete with alternative approaches to preparing workers for careers, employers, workers and the public must have confidence in the quality of skills that apprentices learn and apply. As the U.S. attempts to build a well-functioning and large scale apprenticeship system, creating mechanisms to assure rigorous assessments of the skills and competence of apprentices will become important for achieving the system's reputation for quality. Currently, only some apprentices are subject to an assessment external to the firms undertaking the training. This paper examines the system for assessing apprentices in Germany, discusses its strengths and limitations, and draws lessons for the United States and its efforts to expand apprenticeship.

Review of the German Apprenticeship System

Training under the German dual system takes place at the employer's work site and the vocational school. It is aimed at teaching young people the necessary skills, knowledge, and competence to succeed in the changing world of work. It provides training in broad occupational skills that enable workers to respond to changes in the workplace. The occupational preparation covers a broad range of skills while maintaining enough specialization to generate high productivity at the workplace. Upon completion of the apprenticeships, completers should attain the skills necessary to practice their occupation in accordance with the qualifications specified in the national occupational profiles. To demonstrate competence in the relevant occupation, apprentices must perform well on a final examination of occupational skills.
Cooperation among learning sites, which is a fundamental principle of the dual system of vocational education and training, is based on the insight that every occupation must be experienced to be learned. Reflectiveness in the profession requires extensive workplace experience and systematic work experience and training.

The apprenticeship system is governed by the Vocational Training Act and the Crafts Code, which covers the design of apprenticeship agreements, training conditions, to rights and responsibilities of the apprentices and the training companies. It also stipulates, above all, how trades and occupations are created. The chambers of commerce, industry, and crafts are organizations with statutory responsibilities. They have important legally defined tasks: to review and register the training agreements and, among other things, to accredit training companies. They also conduct the examinations and certify the awarded professional qualifications.

Nationwide standards for government-recognized basic and advanced training occupations provide a high degree of transparency regarding qualifications. The final examination is especially important in this respect; it represents an important tool for quality assurance in apprenticeships. The structure of the relevant examination, the expertise to be tested, and the duration and weighting of individual test elements are specified in the examination requirements, which are part of the respective training regulation.

Certified trades are updated (development of administrative measures), as the economy changes and employers demand new qualifications. The Federal Institute for Vocational Education and Training is responsible for designing and adjusting standards, in cooperation with experts appointed by the employer and labor organizations. Evaluations are conducted based on recognized standards and aim to examine the developed regulations’ practical suitability and application and to provide important advice on the design of new regulations.

How German Apprentices Are Assessed

At the end of their training, apprentices must take a comprehensive examination to determine whether they have acquired sufficient occupational skills during their training period. Occupational skills are defined as “the readiness and capacity of the individual to conduct him or herself in professional, social, and private situations in a manner which is appropriate as well as individually and socially responsible.” It is subdivided into professional skills, personal skills, and social skills.

The legal framework for the examination is determined by the Vocational Education Act and the Crafts Code. As the competent agencies, the chambers of industry and commerce and the chambers of crafts and trade are responsible for conducting the exams. The examination regulations are governed by examination procedure law. The training regulations of each occupation define the permissible examination content.

The examination committee consists of at least three members of the employer organizations and labor unions; each side must be represented in equal number. The committee is complemented by at least one faculty member of a vocational school. All examiners are entitled to receive leave of absence to participate in the examination committee, generally with pay. The entire examination committee decides how to evaluate individual exam sections, the total exam performance, and whether the
The examinee has passed the exam. The examinee may challenge the decision with the competent agency. If the challenge is rejected, the examinee may appeal the decision before the administrative tribunal. The administrative tribunal must review and legally settle the case. Upon passing the exam, the apprentice receives the examination certificate from the competent agency.

There are intermediate, final, and extended final examinations. The intermediate examination determines the level of attained training to adjust or revise further training. Shortfalls in the level of attained training are identified when performance does not meet requirements. For this reason, individual results are not expressed in terms of a grade. Moreover, the apprentice does not pass or fail the intermediate examination. Rather, he/she is issued a certificate of participation reflecting the level of attained training and any shortcomings identified. The intermediate examination must take place at a time when skills can be tested and necessary adjustments can still be made. Most of the time, the intermediate examination is conducted halfway through the training program. The final examination is conducted at the end of the training period to determine occupational proficiency. It may be conducted as a one-part exam at the end of the training period or in two parts conducted at two separate times (extended final examination). In the case of the one-part exam at the end of the training program, an intermediate examination is required.

Testing includes written assignments that are practice-related and job-specific. The assignments produce results such as solutions to individual questions, business letters, parts lists, circuit diagrams, project documentation, or user manuals. These components test subject knowledge, understanding of background and relationships and/or systematic procedures and approaches. The examinee discusses technical questions, subjects, and procedures as well as problems and solutions. The goal is for the examinee to demonstrate understanding of background and relationships, systematic procedures and approaches and/or communication skills.

Under a simulated conversation or role-playing, the examinee acts in his/her future occupational function while generally the examiner or a third party assumes the role of the interlocutor. This could be an internal or external customer, a guest, or a colleague. The examinee may be given the option of using prepared documents during the talk. Examiners formulate their own exam requirements for the simulated conversation. The examinee is given the task of producing a work product typical of his trade. Such a product could be, for example, a metal or wood product, a computer program, a marketing concept, project documentation, a technical drawing, or flower bouquet. The examinee must carry out an activity typical of his trade. It could be, for example, a service, repair, or maintenance. The examinee must carry out an assignment typical of his trade which is likely to occur at the company. The assignment is proposed by the company, approved by the examination committee, and carried out at the company or at the customer site.

Strengths and Limitations of the Assessment System

Legal standardization gives the dual system of vocational education and training its own basis for quality assurance which rests on regulatory guidelines. They are enshrined in the Vocational Training Act and the Crafts Code and training regulations. The elaborate oral and written testing, the required performance of tasks undertaken in the occupation, the diversity and knowledge of trainers, and the external nature of the
testing yield confidence that completers have attained high levels of occupational competence. In 2012, 445,000 men and women passed their final exams, concluding their training with a vocational degree and occupational certification based on an apprenticeship. Apprentices achieved a success rate of 90 percent.

Still, there is a big discrepancy in the quality of apprenticeship training among certified trades and companies. While training quality may vary by size of firm, professionalized training in large corporations is not always superior to the training that takes place at small and medium-sized enterprises. The trainers and the chambers responsible for testing are often engaged in other activities and therefore cannot always respond sufficiently to shortcomings in company training. The state of quality assurance at the companies varies greatly. The labour unions have demanded implementing independent frameworks for quality assurance and external monitoring for apprenticeship and other vocational education and training.

Anyone who wishes to serve as a trainer in the apprenticeship system must demonstrate both technical qualifications and appropriate personal attributes. Trainers are generally skilled workers who have several years of professional experience and have taken a two-week course at a chamber of industry and commerce or chamber of crafts and trades to prepare for the AEVO exam. Trainer aptitude includes the ability to independently plan, conduct, and monitor vocational training, as well as to plan and prepare training programs, to collaborate in the hiring of apprentices, and to conduct and conclude training. Today, some 90,000 people per year take the trainer aptitude examination.

A trainer must be able to examine the capacity of the company to offer training in the desired certified trade; to create a company training program on the basis of a training regulation geared toward the job-specific work and business processes; to create the necessary conditions and foster a motivating learning environment; to select training methods and materials appropriate to the target group and to deploy them in specific situations; to support apprentices with learning difficulties through customized training design and counselling; to prepare apprentices for the final and journeymen examination; and finally to bring the training program to successful conclusion.

Lessons for the United States

The U.S. registered apprenticeship system generally lacks a formal system for assessing the apprenticeship completers. In the case of construction, unions and contractor associations have strong incentives to insure the quality of construction apprenticeships and often incorporate assessments outside the training firm. But, even these assessments are not required by Labour Department’s Office of Apprenticeship. One lesson from Germany is that serious external assessments can increase the reputation of an apprenticeship system. Second, even assessors with technical competence should undergo training to perform a variety of functions. Third, a quality assessment model builds on a set of country-wide occupational skill standards. Finally, while the U.S. need not fully embrace Germany’s assessment model, it should attach a higher priority to developing a credible approach to externally assessing apprenticeships.
A Qualitative Research of Apprenticeship Competency Training in School-based Master Studio in China

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Students can learn a lot from authentic working world, but sometimes it is hard to find suitable enterprises to support dual apprenticeship training. Apprentices are trained as production line workers in some large enterprises. At the same time, in some small enterprises, students lack study opportunities and their professional competencies can’t develop appropriately.

What are the best ways for providing students with an authentic work experience in school? Should vocational schools set up factories on campus? In China, many vocational colleges build school-based master studios and get tasks from society to train students. They hope students can get working experience and professional competency on campus.

Research questions
This research mainly focuses on the following questions:
1. The relationship between different working task selecting and apprenticeship competency development
2. Learning scenario and apprenticeships’ competency
3. Master studio teaching and apprenticeships’ competency development

Research Methodology

Semi-structured interviews and case study

Qualitative semi-structured interviews and case study methods are applied in this research. Researchers interviewed 2 studio masters and 10 students in two vocational colleges. The longest interview lasted 96 minutes and the shortest interview was 40 minutes.

These cases and interviews results are analyzed by qualitative software NVivo 11.0 and conclusions are drawn by the analyzing results. Researchers also collected and analyzed 10 students’ working blog and teaching and learning material from 2 studio masters.

Observation method
In this research, observation method is used to estimate non-visible factors, to ensure that complementary or compensatory methods suited for also understanding the non-visible aspects of this research issue are taken into account. Researchers stand nearby the students who operate the machines in the learning factories. Researchers observe how masters supervise them and give them advice and how they manage and interact in working between different apprenticeships.

**Research Findings**

1. Working task selecting and apprenticeship competency development
   1) Working tasks selection is a critical factor to the development of apprenticeship competency
   In School-based Master Studio, masters are both enterprises’ high skill master and schools’ teacher. They have abundant working experience and they also work for enterprises. Generally, masters design students’ learning tasks according to authentic enterprise working task. Those working tasks were transformed into learning task which match apprenticeships’ professional competencies knowledge level.
   
   “I design some traps in the learning tasks, if my student don’t carefully think about the hydraulic pressure in the whole building, they will face trouble to when the controller runs. That knowledge point I have emphasized in my class and now it is time to check whether they can use it into real work.”
   
   ——— studio master

   2) Ill-defined working task can promote students professional competency development mostly.
   “I allotted working task to my students not randomly, if you analyze it very careful, you will find every student’s task is different. These are careful thought according to student’s competency level. Another point is that these tasks are all ill-defined tasks. The answer is opened, and there are many methods to find out solutions.
   
   ——— studio master

   3) Apprentices develop self-learning competency during working process.
   “I think these tasks are very helpful and I learn how to deal with authentic work. I must finish it within limited time, because our guests are waiting for their orders. It pushed me to learn from different people and communicate with guests which I never got in touch with. I think I learn more comparing that I was trained as production line workers.”
   
   ——— apprenticeship in the master studio

2. Learning scenario contributes apprenticeships’ comprehensive competency
   1) Complexity learning scenario contributes most to the development of apprenticeship’s comprehensive.
   “I find complex learning scenario help apprenticeship greatly. Few days ago, I am crazy busy because a very important guest needs his productions urgently. I almost spend all my time to make robotic component for him. I let my apprenticeship discuss a new order with our new custom. It is small order, I don’t think my apprenticeship can
get the order. Surprisingly, he did it successful and makes all the productions by himself. My apprenticeship told me he learned a lot from this order.”

—— studio master

“I have worked in a production line three months. Frankly, I don’t think I learn something in the production line. My all days’ work is installing electric components, very simple work and extremely boring. But in my masters’ studio, I think I learn a lot. The working task is complex and ever-changing, every working task is different, and some tasks are very challenges. I have to learning, thinking and reflection.”

—— apprenticeship in the master studio

2) Working organization style contribute to learning outcome

In one master studio, apprenticeship’s working task are organized by team work. The master allocated tasks to senior apprenticeship and then the senior apprenticeship will lead and organize junior apprenticeships to finish the work. The community of practice works very well in the studio.

“I learn a lot from my master, but I really enjoy the team work organization style. My directly boss is not my master, but our senior apprenticeship. He will organize the whole work process. He allocates work to me and my colleagues. I think I learn much more from them. Sometimes my master is very very busy, and he have not time to look after everyone. If I have some questions, I always ask our team leader but not my master. Only my team leader can’t answer it, I will ask my master.”

—— apprenticeship in the master studio

“I have my school’s task and company’s work; sometimes I have no time to look after every apprenticeship. So I teach senior apprentice firstly, and then they will teach junior apprenticeships. I think this way works very well, it lets me focus on more important things and if the senior apprentice can’t deal with something, I will hand over it.

—— studio master

3. Master studio teaching and apprenticeships’ competency development

1) Apprenticeship can get working process knowledge in school-based workshop through authentic working tasks

“Our school has tried to contact companies and send our students as apprenticeships, but it didn’t achieve good effect. Some companies only regarded our students as cheap work force and they are allocated simple and repeatable work, students told me they can learn nothing. And our partners are very stable, this year they might accept 5 students, but next year, they accepted nobody. We can’t guarantee every student to find a position every year. But the new trying of master studio achieves good effect, masters have their own studio and students can get in touch with authentic working tasks and develop their professional competency. I think apprenticeship can get work-process knowledge and develop their competency.
"I think the most important point is authentic working task. Though students worked in studio, but their working tasks are from companies, and they can go to company to check whether their production fit enterprises’ requirement. If students graduated from the studio, they can very easy to transfer to labor market, because the working contents are same.

2) The teaching style and characteristic of master has great influence to the competency development of apprenticeship

"I learn a lot from my master, but my another classmate in another studio don’t think so. We have discussed this problem. He told me his mater don’t know how to teach them. When my mater process a bearing, he lets me watch his action and in the key point, he will stop and let me see how to operate the machine tool. But my classmate told me his mater never stopped and after he finished, he just lets him do. The process is very complex and he can’t follow every step.

"My master has too much work from company, he is so busy and I have not too much time to get in touch with him. Sometimes my senior apprenticeships also don’t know how to operate, so we have to wait for my maters’ time.

3) School teaching content should integrate into master studio learning

"Working task choosing is very critical. Because my apprenticeship is in the second year, they are still lack of some of the knowledge and skill which my working tasks required. I have to make up some lessons for them to support them finishing company’s task. It is a trouble that school’s lesson can’t follow authentic task requirement. I can’t require school to open some courses for few apprenticeships.

"I think I work harder than most of my classmate who they are not in the studio. Because we have to finish companies’ tasks, and some task need more knowledge and skill which in class we never met before. So we have to learn by ourselves. Though our mater also gives us lessons, but we have to depend on ourselves if we can fit companies’ requirement.

Literature
2. Ran Shan, Teaching design and learning in vocational college constructional studio. Teacher, 2010(19) 58-62
A Qualitative Study of Traditional Arts and Crafts Apprenticeship Skills and Deliberative Practice

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Summary: “Traditional Arts and Crafts” is one of five major aspects of intangible cultural heritage which has been transmitted from master to apprentice. As the skills are ones of heritage, apprenticeship skills are developed in a variety of ways, one of which is deliberate practicing. In this paper, one of the four famous types of Traditional Arts and Crafts, carved lacquer, is used as an example to explore the apprentice carving skills and deliberate practicing process. The study found that the sculpture skills include “la,” “qi,” “pian,” “chan,” “gou,” and “jinwen,” each of which has its own tools and unique techniques. Deliberate practice activities include sculpture exercises, watch works, paintings and peer learning, deliberate practicing with long-term, high goals, reflective, situational, but also has the characteristics of high focus, feedback.

Keywords: Traditional Arts and Crafts; carved lacquer; skills; deliberate practicing

Introduction

1.1 Research background

“Traditional Arts and Crafts” is one of the five major projects covered by intangible cultural heritage. At present, there are few people in the field of Traditional Arts and Crafts. In the case of carved lacquer, there are two arts and crafts masters in Beijing and 15 arts and crafts in Beijing. [1] How best to cultivate Traditional Arts and Crafts talent to inherit China’s outstanding traditional culture has become the main problem we are facing. Traditional Arts and Crafts are an important part of the inheritance of skills in a variety of ways, such as master imitation, peer exchange, and deliberate practice.

A CNKI input search of “traditional arts and crafts,” “traditional arts and crafts talent training,” “Traditional Arts and Crafts skills acquisition,” “deliberate practice,” and other keywords found that the study of Traditional Arts and Crafts placed more emphasis on hand style and characteristics. Based on this, this study takes the engraving technique of carving lacquer as the entry point, and explores how the apprentice is deliberately trained in the process of acquiring skills.

1.2 Definition of concepts
1.2.1 Traditional arts and crafts

Traditional arts and crafts has a long history of superb skills passed from generation to generation, during which a complete process and the use of natural raw materials was developed. With distinctive national style and local characteristics, Traditional arts and crafts enjoy a high-quality reputation for a variety of handicrafts and skills at home and abroad. [2] In this study, there are at least 1,400 years of history in China surrounding one of the four famous crafts which represents the highest level of traditional Chinese arts and crafts, with a complete process and the raw materials used are pure natural materials - large paint.

1.2.2 Carved lacquer

Carved lacquer is an extremely important category of Chinese traditional lacquer ware; one of its historical uses was to make the emperor's throne. Carved lacquer, also known as lacquer carving, tick red, tick yellow, etc., is the use of large paint plus tung oil made of paint, and which is then painted with colored paint to a certain thickness on the upper body of the object, after which it is carved in a particular Way to reflect its artistic value. [3] Carved lacquer models simple and solemn, with elegant and exquisite decoration, and no deformation from moisture or heat. The carved lacquer production process should be roughly divided into design, fetal embryo, for the ground, light paint, painting, sculpture and other ten steps.

1.2.3 Skills

At present, there is no uniform definition of skills. In general, skills refer to the industry in various fields, for specific tasks or problems, under certain conditions, which can go through a certain course of operation to achieve the objectives and meet the standards, and are obtained through continuous practice. In this study, apprenticeship refers to the indiscriminate use of carving techniques in a given task or condition.

1.2.4 Deliberate Practicing

Simon believes that deliberate practicing is a well-designed long-term, special training activity designed to improve the current behavior of the individual. [4] Sorrent and Claire argue that the workplace is designed to raise the regularity of individual behavior Activities that are deliberately practiced [5]. Based on this, we believe that deliberate practicing in apprenticeship in real situations, by the master specially designed or individual initiative, to improve the individual's current behavior and skills level, is the ultimate achievement of the individual decisive role in the long-term, special training activities. Deliberate practice includes both individual and group behavior, specially designed activities, as well as routine work activities that include the training. In this study, the carving industry has a long history, and the interview object and its master are the focus of the field.

1.3 Research Questions and Objectives

The aim of this study is to explore the techniques of apprenticeship and the acquisition of traditional crafts. The specific research questions are: 1) in the field of carved lacquer, what are the carving techniques an apprentice develops? 2) In the process of acquiring engraving techniques, how is deliberate practicing utilized?

Methodology

In this study, we used the methods of interview and physical analysis. In the
selection of the object to take the purpose of sampling, the interview object is Beijing JiGuWenFeng master NM, Beijing three master of arts and crafts, Beijing for nuclear representative representative, “Wen's tick red” carved lacquer heritage Person, on behalf of works “Water Moon Goddess of Mercy” and so on. Interviews were conducted in a one-to-one half structured. The physical analysis method is mainly based on carved heir to the WeChat public number, carved lacquer related books, traditional arts and crafts books and knowledge of the relevant literature to collect information. Nvivo 11 software was used to construct the results.

Results
3.1 traditional crafts apprentice skills - carving techniques
The skills of carving in the carving process include “la,” “qi,” “pian,” “chan,” “gou,” and “jinwen”. Carving in the sculpture many times is required no matter how complex the image, transport knife to a knife in place, especially in the assassination and rush when not heavy knife. The difficulty of carve is “degree”, with the knife's strength, angle.

“la” is the use of bayonets into the paint layer, tied to the mattress layer close to; “qi” also known as tick, is not necessary to remove the carved parts, leaving only the pattern of useful parts; “pian” is the use of blade on the grain above the paint layer, according to the requirements of the carving design, the requirements of the embossed art of the intrinsic relationship, level, depth, distance, perspective, etc.; “chan” is when the blade with a slice of the level is difficult to slice the expected effect, then use the ear with the blade to carve; “gou” is completed in the above procedures, the use of scissors in the required parts of the hook line, Silk veins, as well as in the paint directly on the pattern, and then filled with gold powder; [6] Jin Wen has more than 100 kinds, and can be used to carve a variety of leaves, dragon scale, houses and other complex and varied decoration as a background.

In the carving skills, “la” and “jin wen” are one of the most complex basic skills. “la” is a sharp double-edged tool, near the vertical angle in the paint layer along the printing ink. The carving tools of “jin wen” are divided into linear and curved line types. In the works of the grain lines of the curvature, hardness and shape changes to show the environment and the plot, the formation of sky jin wen, to ground jin wen, water jin wen. The basic techniques include tooling, triangular exclusion and bright skin.

3.2 Apprentice skills acquisition - deliberate practicing

3.2.1 deliberate practicing time
The studies have shown that, whether for the well-structured areas, such as violin playing, or poorly structured areas, such as medical diagnosis, there is a positive relationship of the amount of individual investment and deliberate practicing. In the field of carving lacquer in the premise of training, master carving techniques is about half a year's time, but the master already has nearly 20 years of experience in carving, insisting on practice. “I have mastered this skill, now I still practice, there is not long-term practice, I have to practice to adjust my state, practice is expressive and observation.” “Today, my grain can be done, but I cannot say how good of it, because there is still professional person than me, it increase the effect of the view.”(Carved
3.2.2 form of deliberate practice

By combining deliberate practicing and research, apprentices are in the process of acquiring skills. Deliberately practice activities include: carving exercises, to see themselves and master works, painting, and peer analysis.

Firstly of all from the degree of group speaking, deliberate practice can be individual behavior, and a group behavior. In the process of carving skills acquisition, individual exercises, including individual exercises alone, such as carved lacquer master said

“To imitate, polished, because he is this thing for the second time carving, and then you go to the polishing process. You can go to feel, for example, how he engraved with the cloud, this figure, how these places are carved, the depth of the knife these things, and then wait for you to do more, you yourself to carved when you naturally will be able to carve the kind of effect.”

It also includes a process of learning with peers, including the indirect practice by observing the master's work, such as “the master by me to see the pattern of moire, show carved lacquer factory works, by observing and practice their own in different containers and the shape of the moire is more suitable.” Skills are also gained through participation in the real works to work with colleagues, “My first work is worth tens of millions of a large screen, as one of the upper hand sculptor to participate in this work. A total of four master together in the production, in fact, I live this is still good, I probably spent about an hour to familiar with the time to do.”

Secondly, from the degree of relevance, deliberate practicing, including the master or other instructors specially designed activities, according to the apprentice personality characteristics and learning progress set goals, such as “la” special training, ‘curl’ is difficult to operate and basically not appear in the physical pattern, when the teacher asked me if you can be able to breathe the knife to the longest to go down and not stop you can do the basic things. The purpose of it is the way to use knife, also training the strength of the fingers.” It also includes routine daily activities, specifically the practice of craftsmanship in the process of making. In the field of carved lacquer, design, paint, paint, tire, for the land, light paint, printing, carving, grinding, polishing wax is the main process of production. So in the daily work also includes the continuous practice of skills. Such as,

“I can do all the processes, but I admit sometimes I am not as a common mechanic. Like the “Jinwen”, the division of the grain is certainly better than me, but the advantage is when I design, I will tell him how much of this place, what kind of Jinwen most prominent, to take into account the overall effect, so have to learn.”

Finally, from the form of deliberate practicing, deliberate practicing not only includes the above-mentioned explicit exercise activities, but also reflects the internal activities of the reflective. Dewey has put forward the “reflection of thinking”, while Ibrahimisi thinks reflection is one of the dimensions of learning. Strong ability to reflect on the
skills of apprentices have an impact on how we cannot be limited to simple action repeat, but rather walk out of the “comfort zone.”

“It is in the portrait carving this piece, in fact, there is no carved lacquer carving skills, carved lacquer very few people do this thing, whether it is from the technical or process materials are not appropriate, in fact, because there is no basis for reference. Then I did not do the beginning, and then I began to think about how to do a good character carving, then the last thought of using clay sculpture continue to practice. So at the beginning has been done, from the first time to do the thickness of nearly five centimeters to the final control in eight mm. The thickness of the range, and do the group like, so this exercise after a long and long time.”

3.2.3 Characteristics of deliberate practice
Deliberate practice not only has the long-term, high goals, reflective, situational, but also has a high focus, feedback characteristics. The acquisition of engraving techniques depends not only on long-term practice but also on demanding apprenticeships. In the process of practicing “la,” in order to control the knife requires tremendous discipline. It is difficult to acquire this skill if you cannot maintain a high degree of focus.

The feedback from the instructor plays a role in promoting the acquisition of individual skills, and the practice of practicing moire is essentially a process of continuous practice of practice-feedback-practice. In addition, the feedback of deliberate practicing not only from the master, peer feedback is one of the sources of learning.

Literature
The Interface between Policy and Practice; Lessons learned from the development and implementation of new apprenticeships in Ireland using the Insurance Practice apprenticeship as a single case and using the European framework to guide this study.

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- Summary: This paper investigates the effectiveness of the development and implementation of the Insurance Practice apprenticeship in Ireland, using the European Commission’s Guiding Principles for High-Performance Apprenticeships and Work-based Learning and recent developments in apprenticeship in Ireland as the frameworks through which this case study is investigated. Using the Guiding Principles, in particular focusing on first two principles in the National Governance and Social Partners’ Involvement pillar of the principles, and demonstrating the central role that these play in the Irish apprenticeship system, the paper explores the development of the Insurance Practitioner Apprenticeship leading to BA (Honours) in Insurance Practice, recognising the roles of the social partners involved and their interaction.

Keywords: Partners, Governance, Insurance, Degree.

Introduction

Insurance practitioner apprenticeship

The Insurance Practitioner apprenticeship was the first new degree apprenticeship in Ireland. A collaboration between the Insurance Institute of Ireland (III), IT Sligo (ITS) informed by an industry consortia steering group (CSG), commenced in September 2016 with 67 apprentices. The projected intake for September 2017 is almost 100 apprentices.

Irish context

Apprenticeship in Ireland has undergone significant reform since the results of a national review of apprenticeship training was published in 2014. The changes include expansion of apprenticeship into new industries and sectors of the economy and for new target groups, new methods of delivery, and qualification at new levels in the National Framework of Qualifications.

A preliminary review of the reform process and outcomes showed conformance with the Model Apprenticeship Principles and indicated that the new model, which builds on a strong tradition of apprenticeship in Ireland, is in line with good practice among other countries (Doran, 2015). A range of apprenticeships have been developed in accordance with this new industry-led approach, and the Insurance Practice apprenticeship was the first of these to be launched in September 2016.
**European context**

The European Commission’s Guiding Principles, published in December 2015, respond to four policy challenges that are considered important to address in the promotion of apprenticeships and other forms of work-based learning:

- national governance and social partners’ involvement;
- support for companies, in particular SMEs, offering apprenticeships;
- attractiveness of apprenticeships and improved career guidance; and
- quality assurance in work-based learning.

The first of these notes that (1), a clear and consistent legal framework to enable apprenticeship partners to act effectively in the context of mutual rights and responsibilities, and (2), structured, continuous dialogue between all apprenticeship partners including a transparent way of coordination and decision-making, are two principles that underpin high-performance apprenticeships. These two principles are embodied in the Irish apprenticeship system, and have proven to be important in the development of the Insurance Practice apprenticeship.

**Methodology**

The paper uses a case study methodology, recognising that many scientists believe that case study research is only useful in the preliminary stages of an investigation (Yin, 2009, P6). As the programme which is the subject of this case only commenced with its first cohort in September 2016, this paper is a preliminary investigation into the development of new apprenticeship in Ireland. It is anticipated that this research will continue and that as the research develops in the future different methodologies may be adapted.

**Results**

**National Governance and Social Partner Involvement in Irish Apprenticeship**

In Ireland, apprenticeship partners include the apprentice; the industry-led Consortium (CSG) that develops an apprenticeship programme and oversees its roll-out and ongoing relevance to the needs of industry; the Apprenticeship Council appointed by the Minister for Education and Skills which includes representatives from enterprise, the Irish Congress of Trade Unions (ICTU), further and higher education and training bodies, and the Department of Education and Skills; the Higher Education Authority (HEA) and SOLAS, the statutory authority for apprenticeship in Ireland. This model draws on and is informed by the National Skills Council, Expert Group for Future Skills Needs (EGFSN) and Regional Skills Fora.

**Status of Apprenticeship in Ireland**

The unique status of apprenticeships in Ireland is enshrined within the 1967 Industrial Training Act which governs all statutory apprenticeships. Key functions of SOLAS, the statutory authority for apprenticeship, include designation of apprenticeship programmes on a statutory footing; a process for approval of employers’ suitability to train apprentices and a register of approved employers; and maintenance of a register of apprentices nationally.

The Act also grants powers to SOLAS to appoint Authorised Officers, who assess employers’ suitability to train and potential apprentices’ eligibility to be employed as an apprentice in a specific apprenticeship, and they monitor apprenticeship training...
activities (Section 42). The Insurance Institute in Ireland (the industry lead body for the Insurance Practice apprenticeship) and the Institute of Technology Sligo (the coordinating provider of the apprenticeship) both liaised with the Authorised Officers throughout the country in the employer approval and apprentice registration processes. The strength and successful development of this apprenticeship was the lead role of the industry partner in consolidating support for this apprenticeship programme and the strong relationship with IT Sligo, which delivered a responsive and timely programme.

Other legislation introduced since 1967 is also relevant, in particular the 2012 Qualifications and Quality Assurance (Education and Training) Act which provides a statutory framework for quality assurance and validation of all education and training programmes. The Core and Topic Specific Statutory Quality Assurance Guidelines developed by QQI for Providers of Statutory Apprenticeship Programmes (QQI, 2016) redefine the apprenticeship landscape with the social partners leading apprenticeship development, provision and quality assurance through the formation of the industry-led Consortium for each apprenticeship.

**Dialogue between all Apprenticeship Partners including a transparent way of Coordination and Decision-making**

As noted above, the apprenticeship model in Ireland includes a range of partners working together to ensure that apprenticeships meet the skill needs of industry and the learning needs of apprentices, and the apprentice is at the centre of this.

![Figure 1 Apprenticeship Partners](image)

At the beginning, however, the development of new apprenticeships represented ‘uncharted territory’ for many. The legislative framework mentioned above, and the creation of resources to support the development and implementation of new apprenticeships helped to successfully navigate this uncharted terrain over time. The QQI Topic Specific Guidelines, for example, were instrumental in this regard (QQI, 2016). The subsequent publication of the 10-step ‘Critical Path’ apprenticeship development process, and the accompanying Handbook for the Development of National Apprenticeships - both of which were informed by the development of the Insurance Practice apprenticeship – have helped to provide a common ‘lens’ to facilitate understanding, coordination and decision-making in the development and implementation of individual apprenticeships (see www.apprenticeship.ie).
According to Steedman, “apprenticeship is strongest in countries where both employer and employee representative organisations wholeheartedly support and promote apprenticeship and the conditions necessary for its success” (Steedman, 2012, p. 11). The Irish Insurance Institute as a professional body has played, and continues to play a key role at system level, and in conjunction with other apprenticeship partners, in the governance and success of the Insurance Practice apprenticeship programme.

The lessons learned include:

- Legislation, social partner involvement, guidelines and other resources have provided a useful means of facilitating mutual understanding
- These, and the experience of their development and utilisation has led to increased confidence and competence for the future
- Recognition of the need to continuously improve the apprenticeship development and implementation processes, to share the learning, and to adequately resource the various elements of, and partners involved in, the process over time

Conclusions

The key benefits of the process benchmarked against the first two of the High-performance apprenticeship and work based learning guiding principles as follows:-

- A clear and consistent legal framework enabling apprenticeship partners to act effectively and guaranteeing mutual rights and responsibilities.
- A structured, continuous dialogue between all apprenticeship partners including a transparent way of co-ordinating and decision making.
- Strengthening the role of social partners by capacity building, assuming ownership and taking on responsibility for implementation.

One of the outputs of this process was the publication of the 10-step ‘Critical Path’ apprenticeship development process, and the accompanying Handbook. This handbook will be used to guide the development of further apprenticeships in Ireland.

Literature


Topic 7: Engaging Employers
Australian Multi-industry pilot programs support better apprenticeship completion rates and employer engagement

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Summary: Australian apprenticeship participation has been declining over the past few years, with completion rates hovering around 50 percent in most industry sectors. Our experience has shown that young people “sign-up” to a four year apprenticeship without having a strong understanding of the trade, their long term career goals or the employers expectations. Group Training Organisations (GTO) were established in Australia in the 1980’s to support individuals and employers, and this sector have recently been piloting a new multi-industry program which assists with overcoming many of the traditional reasons for non-completion.

Keywords: Apprenticeships, Traineeships, improving career choice and completion rates

Introduction

The high attrition rate and reducing number of apprenticeship enrolments in Australia are challenges which continue to cause concern with industry, employer groups and government.

Left unchecked the continuing decline in qualified trades people will leave the nation with skills shortages across a range of services. It is essential that there are sufficient numbers of skilled workers to sustain services in traditional and emerging industries, and to maintain living standards for the future.

Research in Australia has indicated that one of the main reasons that apprenticeship completion rates are hovering around 50 percent is that young people don’t have the opportunity to research, trial and experience a range of vocational options before having to commit to a three to four year qualification before they start. Many young people have limited opportunities to experience working life within a range of different occupations, and rely on school, family or friends for initial career direction.

While traditional pre-apprenticeship programs in Australia provide an introduction to a particular trade before commencing the full apprenticeship, they do not provide an opportunity to trial a range of vocations, nor do they provide the opportunity for young people to develop skills, knowledge and capabilities to make an informed career decision. These are some of the key principles identified as part of the process of career
development and yet are not provided to people at the stage of vocational career selection.

The research available to date in Australia, indicates that there are many factors involved in a person not choosing to undertake an apprenticeship or not completing the apprenticeship they commenced. When attempting to influence the decision-making process, there is rarely a single answer, which will affect the desired outcome. All influences need to be reviewed and where possible altered in the attempt to bring about improved results.

(Pre-apprenticeships and their impact on apprenticeship completion and satisfaction, By Tom Karmel, Damian Oliver, NCVER Research report 2011)

Main reasons for apprenticeship non-completion include:

- Problems with employment 33.4%
- Didn’t like the industry/ work 16.9%
- Doing something different 14.6%

(Understanding the non-completion of apprentices, Alice Bednarz NCVER Occasional paper 2014)

**Multi Industry Pilot project**
We believe the opportunity to undertake a range of work experiences to gain a better understanding of the sector, employer expectations and to research various industry pathways and requirements may provide the platform to develop skills, knowledge and capabilities leading to making an informed career choice for young people.

In May 2016, the Multi Industry, School Based and Pre-Apprenticeship Support Project (MIP) was established by AEN with the support of the Australian Government Department of Education and Training.

MIP is designed to develop opportunities for young people, either in school or seeking employment, and potential employers to trial a number of different trades or vocational roles before committing to a full-time apprenticeship or traineeship.

It is anticipated that better-informed career choices will improve retention rates in apprenticeships and traineeships, and that potential employers can use the program as a recruitment tool.

**Methodology - MIP delivery.**
The MIP is trialing a range of diverse and innovative ‘prior to’ apprenticeship programs with the aim to review outcomes for both individuals and employers that will assist in identifying best practice programs for pre-apprenticeship entry and barriers to apprenticeship completion.
MIP is designed to obtain data directly from the target audience prior to entry into an apprenticeship, and through to the completion, this will add a unique perspective to
existing data, which currently captures statistics at the apprenticeship completion or non-completion point.

The project also aims to identify and develop potential new programs, new curriculum and new arrangements to provide a range of work experience opportunities coupled with broad based training for our next generation of apprentices and trainees. This could lead to the development of new curriculum at the pre-apprenticeship level and may lead to new pathways for entering apprenticeship and traineeship programs.

Victorian, Tasmanian and NSW GTO’s are working closely with TAFE and other training providers and a range of host employers to develop industry themed programs to rotate participants through three to four different industries.

At the completion of these programs secondary school students would move into a school based apprenticeship and progress into a full-time apprenticeship when they leave school. Those in the unemployed stream will progress directly into a traditional pre-apprenticeship program or a full-time apprenticeship.

**Key Features of the MIP**
The project works with a range of training providers and industry stakeholders to develop the curriculum and assessment requirements and activities for new holistic multi-industry programs. GTOs coordinate the work experience placements and assist schools and TAFE with the training requirements.

The five Industry themed programs are:

- **Engineering & Automotive** - Fitting, welding, manufacturing, aerospace, mechanic, auto electrical, panel beating, electronics.
- **Business & Services** - Marketing, HR, Administration, retail, hospitality, IT, Transport & Warehousing.
- **Building & Construction** - Plumbing, carpentry, bricklaying, w&f tiling, concreting, flooring, IT, landscaping, electrical, IT, air conditioning, electronics.
- **Land, Food and Fibre** - Agriculture, Horticulture, Landscaping, Environmental sustainability, Civil Construction.
- **Health / Community Service** - Dental, Childcare, community services, aged care.

GTO’s run programs in either single or mixed themes. The range of themes used must be connected to potential local employment outcomes available.

Practical and theoretical student based research and activities include;

- industry specific numeracy, language and literacy skills
- workplace “readiness” – understanding employer expectations
- sustainability / environmental requirements of particular industries
- hands on basic skills and OH&S
- legal / legislation requirements of working in particular industries
o business processes, project management and communication skills
o new and emerging technology for particular industries
o career and further study pathways available in different industries

Project Measures
o Young adults’ knowledge of apprenticeship/traineeship and industries at entry and exit of project
o Participant’s assessment of value of various elements from the project
o Assistance to participant’s career decisions
o Work experience host employer’s view of individual’s work and industry readiness, attitude and aptitude
o Work experience host employers view of the value of and input needed to host work experience
o Participants career pathway outcome as identified at the 6 month point post completion
o Stakeholder outcomes - completion rates, employment outcomes
o Identification Best practice ‘prior to apprenticeship/traineeship’ programs for other VET stakeholders

MIP Results to date (June 2017)
- 89 percent of students found the program good - excellent.
- 97 percent said they would recommend the program to others.
- students found, practical workshops, OH&S training and work experience as the most valuable components of the program.
- 48 percent of participants have now selected a new career / industry pathway as a result of MIP.
- 76 percent of school based participants said they “definitely” want to undertake an apprenticeship post secondary school.
- 63 percent of hosts said participants were enthusiastic or very enthusiastic during their placement.
- over 62 percent of host employers thought participants were suitable or extremely suitable candidates for their workplace needs.
- project completion results: currently tracking at 35 percent employment outcomes with over 80 percent of school based participants continuing at school

Literature
Tom Karmel, Damian Oliver, NCVER Research report 31 March 2011. Pre-apprenticeships and their impact on apprenticeship completion and satisfaction.

Improving engagement of construction industry firms in apprenticeship training in a post-recession economy

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Summary: The Irish economy is currently experiencing a recovery phase following a ‘lost decade’ of growth due to the severe economic downturn of 2007. While the construction industry in Ireland is recording increased output, and improving rates of employment, in the vital economic and labour market sector of apprenticeship there is a significant lack of engagement. Without employer buy-in to apprenticeship training, there exists potential future skills gaps and lack of efficacy of the construction industry. This increasingly likely possibility is disquieting, not just for the possible impact upon the future of apprenticeship, but also for the Irish economy as a whole, given its reliance upon the capacity of the construction sector to deliver domestic requirements and meet the building and infrastructural needs of foreign direct investment.

Keywords: apprenticeship, engagement, Ireland, skills

Introduction

The current model of apprenticeship training for craft-related trades in Ireland, the Standards Based System (SBS), has been in operation since 1993. Since its inception, this model of training was regarded as a major success in the provision of high quality training, providing industry with a cohort of highly qualified tradespeople. These individuals entered the labour market at the beginning of the ‘Celtic Tiger’ economic boom for Ireland and consequently helped enable the delivery of the plethora of major construction and infrastructural projects of the period. The result was nothing short of the SBS being exalted as a model of excellence in apprenticeship training.

Recession

However, upon the impact of the devastating economic downturn of the 2000s, it became apparent that the previous economic boom had disguised the fact that the SBS was overly-reliant upon employer engagement to succeed. For an individual to be registered as an apprentice, he/she must first find an employer. As a result, the apprenticeship system in Ireland suffered an overwhelming collapse as approximately 23 percent of construction firms - potential employers of apprentices – became insolvent (DKM 2016). In addition, many solvent firms underwent significant changes, such as downsizing employee levels, to remain viable.

Employment
Consequently, direct construction employment, of which apprentices are included, reduced by more than 60 percent (Central Statistics Office 2016). The knock-on effect to apprenticeship was a reduction in the number of registrations of new apprentices by circa 76 percent. This was such a diminution of apprenticeship engagement that by 2010 there were more unemployed than employed apprentices in Ireland (SOLAS 2015).

**Methodology**

All points discussed herein are based upon the literature review of ongoing PhD research. Since a decline of such proportions in apprenticeship has never been recorded in Irish history, no national literature currently exists from which to draw stimulus. Thus, this paper examines the determinants of the current training system in Ireland.

As this work is ongoing, it does not purport to be conclusive. However, the aim is to prompt inquisitorial evaluation of stakeholder engagement given the symbiotic relationship between apprentices and employers within the industry.

**Stakeholder research study**

As the matter of employer engagement in apprenticeship is of extreme importance to the construction industry in Ireland, the national construction employers’ representative body, the Construction Industry Federation (CIF) has commissioned a research study of its membership on the issue. The study is currently in its first phase which is a quantitative analysis of employer engagement in the use of trades and apprenticeships. It is intended that the findings of the research study will be published in the form of an industry report by the CIF in Q4 2017.

**Demand and Supply**

The Irish economy is currently in recovery; the construction industry is recording positive output; construction employment is increasing and yet there is a lag in the recorded number of new apprentice registrations (DKM 2016). As stated, for an individual to become an apprentice in Ireland, he/she must first be employed. Despite the economic recovery and growth in the construction sector there remains a reluctance by firms to engage in apprenticeship training. Given the dependence by potential apprentices upon employers’ willingness to engage in training it is vital that the conditions for employer buy-in be examined and supported.

**SBS Training Model**

Ireland’s SBS apprenticeship training model is a dual system. True to the ethos of blended learning, it divides an apprenticeship into phases of on-the-job and off-the-job training. The SBS utilises ‘block release’ periods of off-the-job training as opposed to ‘day release’. The downside of this structure from the employers’ perspective is that the off-the-job phases leave firms without apprentices for large periods of time (10 – 20 weeks).

Though there is yet no definitive reasoning as to the lack of employer engagement, it is reasonable to assume that ‘block release’ makes apprenticeship training unattractive to many companies. Though anecdotal, this preposition is based on the fact that over 90 percent of construction firms in Ireland are ‘micro firms’, having less than 10 employees (DKM 2016). It is likely that such small firms are ill-equipped to release an employee (apprentice) for five months to off-the-job training.
Review of Apprenticeships

Given the toll of recession upon the apprenticeship system in Ireland, the government announced a review of apprenticeships with an aim to addressing the issues concerned (Department of Education and Skills 2013). However, rather than addressing the disarray surrounding the existing current trades, the government unveiled an action plan aimed at expanding apprenticeship, as a paradigm of education, to other areas of industry (Department of Education and Skills 2016).

Though this action is meritorious, this was, potentially, a lost opportunity to assess employer sentiment in Ireland, regarding existing apprenticeships. The review engaged the entire community of stakeholders to apprenticeship in Ireland and yet failed to assess the determinants of engagement in training and more importantly, the barriers facing employers at the time.

Impact of the economic downturn

The impact of the recessionary conditions of the last decade upon the industry are clearly evident in terms of the number of new entrants to apprenticeship. Within the construction sector, those designated as ‘wet trades’ have struggled to remain viable. New apprentices in the trades of Painting and Decorating and Plastering have declined from hundreds annually to single digit figures while the trade of Floor and Wall Tiling has ceased to register any new apprentices since 2013 and has consequently been rendered a ‘dead trade’ (SOLAS 2015).

This trend is not merely confined to the ‘wet trades’. Similar concerns are expressed for the ‘wood trades’ where the traditional mainstay trade of Carpentry and Joinery recorded new apprentice registrations equivalent to just 19 percent of its pre-recession peak. In addition, to bolster the ailing trades of Cabinetmaking and Wood Machining, it was decided to amalgamate the two into a single new trade: Wood Manufacturing and Finishing. As of year-end 2016, registrations for this trade were less than the 2008 Cabinetmaking figures alone, which were recorded after the impact of the economic downturn.

Future problems due to non-engagement of employers

Ireland’s construction industry faces two significant future problems based on the singular issue of a lack of training. First, without a supply of new apprentices each year, there will inevitably emerge a future skills shortage. In fact, such an issue has already been noted (DKM 2016). Moreover, as can be seen from the issues relating to Floor and Wall Tiling above, a skills shortage will inevitably lead to a skills gap and the inexorable result of lost skills and knowledge.

The second significant threat facing the construction industry is a lack of future management. Construction project teams are made up of several academically qualified individuals e.g. the engineer, the architect, the quantity surveyor (cost manager). However, the construction manager, the person charged with overseeing the actual construction work is usually of a vocational background. It is by virtue of this distinction that the construction manager has the knowledge necessary to oversee the construction works. Those skills, often tacitly developed, from his/her progression from apprentice to tradesman to foreman etc. sets the construction manager apart from the ‘academic’ members of the project team.

As before, if there are no new apprentices entering the knowledge cycle, then there will ultimately be no new tradesmen and consequently no new vocationally trained construction managers.
Overcoming barriers

It is understandable that many employers are cautious about investing in training while the difficulties of the recession are a fresh memory. However, during the economic downturn, many employers turned to the use of agency provision for trades due to the lack of ‘in-house’ available skills. This is rationally antithetical as the use of qualified trades from an outside source is more expensive than ‘in-house’ labour. External trade agencies charge in the order of 1.5 times the trade rate for supply. This course of action may be convenient but is in fact economically fallacious.

Cost benefit of apprenticeship

Ireland’s apprenticeship pay rates are based on a percentage of a qualified tradespersons rate (Fig. 1). As an apprentice is paid significantly less than a qualified tradesperson, it is a sagacious strategy for a firm to employ apprentices instead of outside labour. The difficulty is in getting employers to believe that investment in training is a prudential management strategy.

<table>
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It is likely that employers would rebut the above notion, claiming it to be ostensible given that apprentices are not actually capable of carrying out the work of a qualified tradesperson. This argument is, however, merely liminal and somewhat improvident.

When considering the productivity of an apprentice, it is postulated that he/she will begin to be productively of benefit to the employer after the first year of training (Spear 2014). Furthermore, the employer’s investment in the apprentice will break even before the end of the second year.

As a result, when considering value for money, apprentices are a far more prudential choice of labour than employing external sources, given their capacity for high productivity at a lower rate of pay.

Conclusion

As there are currently no definitive results detailing the explicit barriers to apprenticeship, it has been possible only to highlight the determinants of apprenticeship and highlight subjective barriers. It is hoped that the aforementioned CIF report will provide valuable empirical findings which through analysis and discussion may help clarify the drivers of employer engagement and aid the development of a phronetic strategy for the benefit of all stakeholders to apprenticeship.

Literature


Analysis of the decision logic and internal measures used by large German industrial firms to support investment in large-scale apprenticeship style workforce development programs

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Summary: In recent years, there has been significant research undertaken in developing frameworks and models which measure the benefits of apprenticeship programs at a firm level. The evidence consistently affirms superior financial outcomes for firms with programs in operation, and findings have led to the development of improved metrics which firms and intermediaries can use to justify establishing formal apprenticeship program investment. However, across the US, there remains limited penetration of formal apprenticeship programs, compared with other jurisdictions, and a widespread lack of awareness of these benefits at a firm level.

The German apprentice system is a world-leading system, and many German industrial firms have instituted apprenticeship programs within their US subsidiary firms. Using critical case-sampling and qualitative interviews with key informants from German-owned industrial firms in North and South Carolina, which have established registered apprenticeship programs within the US, the authors sought to understand how large German industrial firms made decisions related to the adoption of formal apprenticeship programs; the extent to which return on investment (ROI) models commonly cited in the literature, such as cost-benefit and employer net cost, are being utilised within firms when developing business cases and internal funding proposals to establish apprenticeship programs; and if alternate non-financial metrics are used. This research will help understand how to mitigate barriers to the adoption of these programs in other contexts and how best to advocate for the adoption of these programs.

Our findings suggest that traditional return on investment models are more valued than approximate financial and human resource metrics by firms when making decision about funding apprenticeship programs.

Keywords: apprenticeships, return on investment, skills, workforce planning
Introduction

There have been significant developments in measuring the net benefits of apprenticeship training in recent years. Efforts to systematically measure the costs and benefits associated with apprenticeship investments date back to the 1970s (Muehlemann & Wolter 2013), with focus on quantifying costs throughout the apprentice training life-cycle in order to calculate economic value created by the investment and how this was shared between the apprentice, the firm and the government.

Under this approach, a firm’s costs for training an apprentice (wages, training, recruitment, infrastructure and supplies) was offset by calculating the value of the apprentice’s productive work — compared with workers sourced through alternative channels — to determine the net benefits (or net costs) of the apprenticeship program (Lerman 2014). Subsequent work sought to include more long-term benefits, such as lower recruitment and retention costs and technical knowledge transfers, into the net benefits calculus, and other researchers used empirical and accounting approaches to develop models to determine the net current cost and the break-even point of an apprentice at any point of the training life-cycle (Gambin, Hasluck & Hogarth 2010).

Government researchers have commonly used cost–benefit analysis methodology to estimate the macro and micro economic benefits and efficacy of apprenticeship investment: for example, a 2009 Canadian Apprenticeship Forum study found that every $1 invested in apprenticeships by firms yields a return of $1.47 in increased productivity, reduced waste, and greater innovation. A 2015 US Department of Labor study also asserted government receives $27 in returns for every $1 taxpayers invest in apprenticeship programs and apprentices earn an $300,000 extra in lifetime earnings, compared with workers trained through other mechanisms.

Return on Investment Rationale

These methodical research approaches have continued to deliver evidence which consistently affirms superior financial outcomes for firms with apprenticeship programs (Strupler & Wolter 2013) and, prima facie, provides a compelling economic rationale to justify the investment in and establishment of wide-scale apprenticeship programs.

It is commonly held that a firm’s decision to engage in apprenticeship training is to a large extent determined by the cost–benefit ratio of such an investment compared with alternatives for securing skilled workers (Muehlemann & Wolter 2013). However, the low penetration of registered apprenticeship programs across the US economy (The US has 21,339 registered programs (DOL 2016) compared with Germany’s 438,000 programs (BiBB 2014)) suggests that this is a necessary but not sufficient
condition for investment, and that potentially there are other non-economic factors influencing firm decision-making in establishing apprenticeship programs.

Further understanding of the extent to which this evidence base is known at a firm level, and is considered and incorporated into the decision making process is valuable for intermediaries to understand and refine strategies for engagement with employers.

Research Methodology

Using critical case sampling techniques and semi-structured interviews with key informants, the authors sought to survey a cluster of human resources (HR) and workforce development and training professionals within German industrial firms which have established German-style vocational educational programs within their US operations, and also US State government intermediaries responsible for liaising with industry. The authors sought to understand how proposals to initiate and fund apprenticeship training programs are justified at the firm level, and to identify which metrics which are used within firms to establish and measure the ROI of their apprenticeship program.

Key questions for respondents

Our interviews centered on these key questions (We also asked our government informants questions about their experiences with these themes):

-When developing a formal business case or budget submission for your program, what types of financial and organizational metrics are applied to justify the investment in the program?
-Which financial metrics and ROI measures do you focus on when measuring the efficacy of your program? Are these common within the industry, or firm-specific?
-Which potential ROI measures are the most persuasive in engaging support for your program?
-If there was reluctance or internal opposition to establishment of your program, how was it overcome?
-Do you know of apprenticeship proposals which have been rejected by a firm’s management, and if so the justifications given for the rejection?
-What features of apprenticeship would you advise government representatives to emphasize to best align with language and agenda of your firms executive management?
Evaluation and Results

Thirteen qualitative interviews were conducted with respondents: 11 from firms, two from government. The major finding of this research was that internal approximate savings or productivity measures were not being used to support investment or to determine ROI for existing apprenticeship-style workforce development programs.

Our interview process affirmed that the financial cost factors (wages, training, recruitment, infrastructure and supplies) assessed through the traditional net cost and cost-benefit models are still the key decision drivers for investment.

As our sample included large high-tech industrial firms with advanced employee performance management systems and information systems infrastructure, it had been expected that data tracked through these systems may have been used for this purpose. This finding was consistent with research of Helper et al., 2016.

One respondent stated he was using internal production data to evaluate the output of work groups with and without apprentices and, then, to adjust his staff mix. (This updated relative productivity measure, if linked with wage-cost data, may become a compelling selling point for advocates in future.)

Multiple respondents indicated that their program was not tightly linked to the firm’s workforce capability and planning cycle, and stated this was due to uncertainty within the HR function about the number of employees the program could source. Most said their firm had been unable to fill all forecast apprenticeship positions, and attributed this to employee screening standards being set from the firm’s head office. Cultural factors were also a strong theme. Multiple respondents suggested their programs were instituted at the direction of the firm’s head office, and received less rigorous scrutiny from the finance function in both management and budget acquittal. Multiple respondents theorized that the culture within the US manufacturing industry is a barrier to apprenticeship development, because the long-term training approach of apprenticeship is inconsistent with the short-term focus of factory operations on maximizing output capacity and output. (Standard practice is to fill labour gaps with new skilled hires, or to offer extra shifts to the existing workforce.)

Respondents indicated this reactive dynamic within manufacturing meant that across the sector, firm managers and finance officers tended to view apprenticeship program proposals as involving a large upfront cost, with benefits uncertain and conditional on a range of factors, to be obtained in the medium to long term. For this reason, upfront cash subsidies or rebates offered by governments were seen as marginal in the decision-making process.

There was also significant support for the view that, to productively engage with employers, government apprenticeship advocates should seek to increase the awareness of apprenticeship ROI studies using data from US cases and environments. Foreign research (even Canadian) was seen as unrelatable and therefore, unvalued.
Conclusion

Advocates for apprenticeship-style workforce development programs should consider the key themes from this research, to aid in mitigating barriers to the adoption of these programs in other US industry sectors.

Literature


Canadian Apprenticeship Forum, 2009, It pays to hire an apprentice: calculating the return on training investment for skilled trades employers in Canada: a study of 16 trades, phase II: final report, CAF-FCA, Ottawa


Lerman, R, 2014, 'Do firms benefit from apprenticeship investments?: why spending on occupational skills can yield economic returns to employers', IZA World of Labor, no.55.

Muehlemann, S, 2016, The cost and benefits of work-based learning, OECD education working papers no. 143, OECD, Paris

Muehlemann, S, Wolter, S 2013, Return on investment of apprenticeship systems for enterprises: evidence from cost-benefit analyses, European Expert Network on Economics of Education (EENEE) analytical report no. 16, EENEE, Munich


US Department of Labor Employment and Training Administration, 2016 Registered Apprenticeship National Results <https://doleta.gov/oa/data_statistics.cfm>
Institutional Arrangements for Artisan Development in the Manufacturing Sector

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Summary: This study explores the range of institutional arrangements for artisan development in the manufacturing industries of the merSETA within the conceptual framework of ‘getting in’ and ‘getting through’ artisan development activities that are governed by various institutional arrangements (Osborne and Gallacher, 2004). The findings indicate that high level governance and collaboration arrangements reflected through policy initiatives do not translate effectively to learning and training implementation. This study has made a strong case for greater consideration of improving the governance of institutional arrangements for artisan development. The study also highlighted challenges experienced with arrangements for artisan development at institutions in general. Despite efforts made by the South African government, industry and other institutions to increase artisan development, artisan development is not occurring at the required pace. Critical to addressing the challenge is effective collaboration and governance with regards to institutional arrangements.

Keywords: Artisan development, 'getting in', 'getting through', collaboration.

Introduction
The need to curb the shortage of artisans has been high on the South African government’s list of priorities. Artisan development in South Africa is viewed as an imperative for the country’s goal to address widespread inequality, unemployment and poverty eradication. Since the inauguration of the democratic government in 1994, numerous interventions have been put in place to increase the number of artisans qualifying through the various applicable routes. More than two decades into democracy, the shortage of quality artisans in South Africa still persists.

A framework for artisan development in South Africa
Artisan development in South Africa is hugely characterized by three stages namely: ‘getting in’; ‘getting through’ and ‘getting on’. The three stages and what they entail are summarised in figure 1 below. This study however focused on the first two stages of ‘getting in’ and ‘getting through’.

Figure 1: A Framework for Artisan Development
The “getting in” stage relates to the recruitment process of selecting appropriate artisan candidates. The minimum entry requirements typically include the NATED (‘N’) N1 to N3 courses, National Certificate Vocational (NCV) Level 2 to 4 programmes and other academic and occupational learning programmes that may allow the candidate entry into a specific artisan development route. Increasingly, in the manufacturing industries of merSETA, matric is the required entry. The requirements for “getting in” are prescribed in the specific respective artisan development routes. Prospective candidates usually achieve the “getting in” requirements for artisan programmes through TVET College and private VET providers guided by UMALUSI as a regulatory body.

The “getting through” stage focuses on workplace based support for learners to ensure they become competent in their trades. The support involves regulatory, funding and training institutional arrangements. Elements of “getting through” include artisan candidate recruitment, registration and induction processes, workplace approval, mentoring, monitoring of artisan candidate training, trade test preparation, accreditation of Decentralized Trade Test Centres (DTTC), funding arrangements and certification of competent artisans. Key institutions of the “getting through” stage include the merSETA, companies, the Quality Council for Trades and Occupations (QCTO) and the National Artisan Moderating Body (NAMB).
Artisan development stages happen within the following policy context:

- The National Skills Development Strategy III emphasized that “workplace learning should be an integral part of all vocational programmes”. Establishing effective partnerships between education and training systems and employers to provide workplace training would ensure that skills have real labour market relevance and that young people gain an early appreciation of and exposure to the world of work. The necessity of having structured bridges to the world of work and quality learning in the world of work is further emphasized.
- The White Paper for Post-School Education and Training also emphasized a need for “…ensuring expanded access to training opportunities, with training taking place in both educational institutions and workplaces…” (2013).

Well-grounded production of cost effective quality artisans depends on the nature of arrangements between institutions of learning and the workplace (Grollmann and Rauner, 2007), supported by coherent policy or regulatory governance. The participants in the development of artisans are equally responsible for the end product, that is, competent qualified artisans who are ready for the world of work. At the core is institutionalising effective collaboration and trust relationships as illustrated in figure 2 below.

Figure 2: The Trust-building Loop

Source: Huxham and Vangen, 2008
“Common wisdom suggests that it is necessary to be clear about the aims of joint working relationships, if partners are to work together to operationalise policies” (Huxham and Vangen, 2008). It is required that the institutions involved with the development of artisans be clear regarding their aims of working with one another at different stages of artisan development. Successful institutional arrangements for artisan development further depend on trade-offs. Collaboration theory suggests that institutions should aim for common outcomes and be willing to take risks in initiating collaborations.

**Methodology**

This study was based on qualitative descriptive research aimed at investigating, documenting, analysing and providing reflections on institutional arrangements for artisan development in the metal, automotive and plastics manufacturing industries. The research mostly focused on the institutional governance of the learning, training and assessment context and not on the learners or trainees. Data collection in this study was mainly through face-to-face interviews and focus group discussions. The study undertook purposive sampling based on relevant partners and institutions that contribute to or have an interest in the development of artisans within the manufacturing sector (Cresswel, 2012). Respondents were classified into five groups:

- TVET College Lecturing and Management staff
- Manufacturing, Engineering and Related Services Sector Education and Training Authority staff
- Representatives from the merSETA Member Companies
- Decentralized Trade Testing Centres representatives

Regulatory bodies for artisan development, QCTO, NAMB, UMALUSI and SAQA were not sampled for this study because the focus was on institutions responsible for the implementation of the artisan development policies.

**Results**

**Arrangements related to ‘getting in’**

Policies that regulate FET College learning programmes contribute to fragmented collaborations between TVET Colleges and industry. TVET Colleges offer anything and everything that might possibly lead to the development of artisans. This poses a challenge in that some of the programmes are legislated in the TVET College Act of 2006, and thus funded by DHET, whilst the unlegislated TVET College offerings are not funded.

Industry has preference for those programmes not legislated for the TVET Colleges, resulting in TVET Colleges’ dilemma of entering into collaboration with industry on non-funded programmes. This preference compromises the quality of provision for both the legislated and non-legislated programmes. TVET Colleges do not have the capacity to
provide multiple-programmes for the development of artisans. Inadequate capacity of TVET Colleges to produce quality candidates is a major contributor to these institutions getting minimal support from industry for collaboration.

The second challenge regarding the quality provision of TVET college programmes is inadequate industry knowledge of TVET College lecturers and limited workshop resources to offer practical skills. Government should consider urgent resourcing of intervention to upgrade the skills and competence of the TVET College lecturing staff that offers programmes towards trades competence so as to facilitate TVET College-Industry collaboration.

Thirdly, there is inadequate technical skills level and poor work readiness of TVET college graduates entering the artisan development market at the firm level. Data has revealed that the mind-sets of artisan candidates regarding trades are mostly negative as they are not willing to get their “hands dirty”. Learners at TVET Colleges should be provided with work readiness skills as well as career guidance that builds vocational professionalism for trade occupations.

The importance of an institution in any form of collaboration cannot be measured through the injection of funds, but through mutual active participation and efforts to monitor collaborative activities. Debate as to whether the TVET college system needs both NATED and NCV programmes is ongoing. The research found that there is concern around the continuous review of policies that support artisan development; however, with the recognition that policy review of the place of the TVET college system in the production of high quality artisans is needed. Governance in the TVET College sector, as alluded by Wedekind (2010), is incoherent and fragmented.

**Arrangements related to ‘getting through’**

Arrangements related to funding, administration and quality assurance of the provision of training highlighted some challenges. The major issue in this regard is the commitment of the partners to the process of artisan development. The performance of the merSETA as an institution responsible for the facilitation of skills development related to trades is measured mostly by targets. The study has also revealed that there are challenges related to quality mentoring and monitoring after artisan candidates have been absorbed into a specific artisan route. Provision in this stage is mainly driven by trade test requirements and includes augmented provision via trade test assessment centres, pointing to low quality provision during the training phase. Reviewed institutional arrangements for the governance and delivery of artisan development should not only be about increasing the number of artisans, but also about building quality artisans.
Conclusion

This study has made a strong case for greater consideration of coherent governance policy to facilitate and manage effective, collaborative institutional arrangements for quality artisan development. Artisan development occurs within a ‘collective of institutions’ interacting with each other. Learning towards artisan development is interactive and context dependent. Artisan development is a collective process between firms, vocational education institutions, other workforce intermediaries and the state. This study has illuminated the challenges experienced in arrangements for artisan development at institutions in general. There is no individual institution that can produce artisans and therefore institutions should have collective consensus on specific but integrated contribution of all the players involved in the artisan development process – the workers, their trade unions, employers, vocational education and training institutions, NGOs and the government (local and national). This institutional collective needs to sit around a table and broker agreements about artisan development.

Literature


Topic 8: Occupational and Organizational Identity and Commitment Research
Assessment of the current state of inclusion in apprenticeship and identification of consequences for in-company training in construction

Christian K. Karl¹ and Martin Lang²

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Summary: This paper gives a short introduction of an exploratory study investigating the unknown status of inclusion in apprenticeship focusing on in-company training in construction. The results show, that inclusive apprenticeship is already a topic in in-company training. Positively is, that in-company trainers are partly interested in it and they have a positive and benevolent attitude towards inclusive education. However, our study gives also evidence for five dimensions of barriers that hamper the implementation of inclusive apprenticeship in in-company training: a) Information, b) Organization, c) Work Environment & Processes, d) Communication & Collaboration and e) Financial issues. Additionally, we have evidences, that thematically delimited brochures and flyers, one-day seminars at an external educational institution and exchange workshops with other in-company trainers seem to be the most preferred methods for professionalization in this context.

Keywords: inclusion, apprenticeship, construction, barriers, in-company training

Introduction

Unlike general education the topic of inclusion in vocational education and training (VET) is still under-researched in Germany (Buchmann & Bylinski, 2013). This is especially true for VET in technical areas such as Construction Technology (CT). A challenge in this context is the qualification of the staff in in-company training which should be align to heterogeneous groups of apprentices. The central goal of a professionalization in vocational training is to provide an "inclusion culture", which characterizes the self-image of the professionals and the ability to self-reflect on their own pedagogical action (Buchmann & Bylinski, 2013). This requires that the education and training for in-company instructors must be re-developed in regard of e.g. content, didactical methodology, personal attitudes and values.
However, few studies have been carried out in Germany to support inclusion in VET, especially in the field of in-company training. Despite this lack of fundamentals, the pressure to act is currently growing in this area. Therefore, this study is essential to bring the current relevance of inclusion more in the focus and to finally provide a first basis regarding obstacles and barriers and possible measures to support the professionalization of VET trainers, which will positively influence the learning environment of apprentices with special needs. Nevertheless, this project has a broader applicability. The used method and the results will be transferable to other domains and give other researchers the ability to conduct similar studies in other domains and countries which can be compared (for instance with a comparable “VET Inclusion Index” based on this project). The full research report is in Karl & Lang (2017).

### Methodology

The general research approach is divided in three steps (Table 1).

**Table 1: General research approach**

<table>
<thead>
<tr>
<th>EXPLORATION (fundamental data)</th>
<th>FIELDS OF ACTION (analysis)</th>
<th>FURTHER STEPS (focusing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify individual and organizational / systemic obstacles and barriers in the current implementation of inclusion in in-company training.</td>
<td>Identification of possible fields of action and measures for the professionalization of in-company trainers.</td>
<td>Methodical as well as substantive further steps, new research questions and initiation of further projects.</td>
</tr>
</tbody>
</table>

Based on this approach we identified the following three research questions.

**Research question 1 (RQ 1)**

What is the current status of inclusive education in the field of in-company training in the field of construction in Germany?

- **Method:** Desk research (literature review), expert interviews, empirical study (online questionnaire, 116 experts participated)
- **Result:** Personal and organizational awareness for inclusion as well as a catalogue of obstacles and barriers

**Research question 2 (RQ 2)**

What are the current qualifications and the competency inventory of in-company trainers regarding inclusion?

- **Method:** Desk research (literature review), self-assessment (online questionnaire, 116 experts participated)
• Result: Real to date competency inventory, role model, behaviours, beliefs etc.

Research question 3 (RQ 3)

How can we support in-company trainers to professionalize their competencies in inclusive education?
• Method: Expert interviews, empirical study (online questionnaire, 116 experts participated),
• Result: List of proposed tasks/ actions for companies, organizations and policy makers and a catalogue of possible measures to support the professionalization of in-company instructors with special regard to inclusive education

Results

More than a half of the involved participants are from micro companies (below 10 employees). Nearly 40% are from small companies (below 50 employees) and the minority are from large companies (over 250 employees). Participants from medium-sized companies (over 50, below 250) are not involved. Within our study, we reached in-company trainers who are involved in nearly all of the main 18 construction professions, despite of special fields like well construction, railway track builder, chimney builder and insulators. Only 15.22% of the participants indicated knowledge about inclusion. 14.29% of them gained this knowledge within their education, 42.86% through previous activities (e.g. worked in workshops for the disabled) and most of them (71.43%) gained informal knowledge about inclusion through private initiatives (readings or personal involvement through family situation). The quality of the knowledge is ranked high by 57.14%, medium by 14.29% and low by 28.57%. In detail, most of the participants indicate that they know what is meant by inclusion. Slightly less is the result for the more specific question “I know what inclusion means concretely for me”. This indicates, that in most cases the general meaning of inclusion seems to be known and therefore a general awareness can be proved, but in some cases the concrete meaning of inclusion for themselves is not fully conscious. One reason for this might be, that in most of the cases inclusion has been not or only in parts addressed in their companies. Interestingly is the fact, that 47.83% are not interested in gaining more information. Further, 50% of the participants refuse that the company opens (more) to inclusion. Apart of this more organizational issue, 45.65% of the experts would refuse to participate in further training measures for inclusive education offered by the company.

Including the other data gained from the online questionnaire we conclude the following main findings for RQ 1:
1. Inclusive apprenticeship is already a topic in in-company training, but it appears not as critical as we suggested,
2. in-company trainers are partly interested in it,
3. in many cases, they have a positive and benevolent attitude towards inclusive education,
4. they see a strong need in communication and collaboration, especially with vocational schools,
5. there seems to be a strong need for support on operational level,
6. information as well as time and cost pressure play a significant role in the implementation of inclusive education,
7. inclusive education is more likely in a larger and therefore more structured company environment.

The main five dimensions of barriers for the implementation of inclusive apprenticeship derived from our study seem to be: A) Information, B) Organization, C) Work environment & Processes, D) Communication & Collaboration, E) Financial issues (Figure 1). With the gained data for RQ 2 we conclude further, that the implementation of inclusion in apprenticeship is no matter of missing competencies. The question here seems not to be “how” the in-company trainers can support and guide the apprentices with special needs (they are competent based on their self-perception); the question seems to be “what” is to do. This directs us to the assumption, that in-company trainers need immediately actionable support at the operational level. Finally, with RQ 3 we identified three preferable measures to support the professionalization of in-company trainers with special regard to inclusive education (in descending order):

- Thematic delimitated brochures and flyers (informal support/ learning)
- One-day seminar at an external educational institution (formal support/ learning)
- Exchange workshops with other in-company trainers (individual support, combining formal & informal support/ learning resp. experience based learning)
Figure 2: Barriers for the implementation of inclusive apprenticeship

Based on our findings, we designed a first draft of a “Causal system for inclusive apprenticeship”. Figure 2 shows just the main influencing factors of this system.

Figure 3: Influencing factors for inclusion in apprenticeship
Literature


Karl, Ch. K. & Lang, M. 2017, Inclusion in Apprenticeship (IncluAp) - Assessment of the current state of inclusion in apprenticeship and identification of consequences for in-company training, research report (URL in preparation)
Apprenticeship Formalization and Gender in Ghana

Daniel Kuehn\(^1\) and Phanwin Yokying\(^2\)

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\(^2\)American University Department of Economics, Washington, D.C.

Summary: This paper summarizes research on gender differences in the wage premium associated with apprenticeship formalization for apprenticeship completers in Ghana, using the World Bank’s STEP Skills Survey. Ghana is currently implementing the National Apprenticeship Program to encourage the formalization of apprenticeship programs. Surprisingly, the wage equations suggest that a formal apprenticeship is associated with reduced earnings for men and no change in earnings for women. The failure of formalization to raise wages appears to be related to the inability of formal apprenticeship to move completers into formal employment. Policies that strengthen the connection between apprenticeship and post-completion employment opportunities should therefore be a key component of the National Apprenticeship Program going forward.

Keywords: apprenticeship formalization, Ghana, gender

Introduction

Data from a World Bank skills survey suggest that about as many Ghanaian women have completed apprenticeship training as men (24.4% of all women vs 24.9% of all men), making the incidence of apprenticeship training considerably more egalitarian in Ghana than it is in the United States, where the large majority of apprentices are men. Although women participate in apprenticeship at rates comparable to men in Ghana, there is a stark segregation of women by occupation, with almost all women completing an apprenticeship in the service or apparel industries (see Figure 1). Men have high representation in craft occupations but are widely distributed in other occupations as well. Women who are apprentices work in formalized apprenticeship at a higher rate than men (21.3% of women apprentices compared to 14.0% of men), which is potentially promising for their future wage and employment prospects.

The government of Ghana has recently expressed concerns about the prevalence of informal apprenticeship arrangements (Palmer, 2009). Informal apprenticeships often lack clearly defined contracts outlining the responsibilities of the employer to the apprentice and what is expected of the apprentice. Frazer (2006) offers evidence that
human capital generated in informal apprenticeships is often not recognized by other employers, reducing the payoff to apprentices and inducing apprenticeship completers to pursue self-employment where they reproduce the production techniques of their former masters, rather than pursuing formal employment opportunities. In response, the government of Ghana initiated the National Apprenticeship Program in 2012 to provide formal apprenticeships to selected secondary school students that are not expected to complete or go on to further education. The program screens employers, provides financial support for apprenticeship training, and mandates a formal apprenticeship agreement. Currently the National Apprenticeship Program covers a small proportion of apprenticeships in Ghana, but the government’s ambition is to bring the program to scale and use it to provide further structure to the informal apprenticeships in the country.

This research uses a gender lens to understand the consequences of apprenticeship formalization in Ghana and highlight any steps that need to be taken to address gender gaps in the formalization process. It addresses two research questions: (1.) What is the earnings premium associated with a formalized apprenticeship for Ghanaian women? and (2.) What is the gender gap associated with this “formalization premium”?

Figure 1: Occupational distribution of apprenticeship completers by gender and formality

Data

We use the 2013 Skills Toward Employment and Productivity (STEP) survey for Ghana, produced by the World Bank. The survey contains detailed questions on apprenticeship experience, labour market participation, and skills for a representative sample of Ghanaians. The dataset includes 839 respondents that have completed an apprenticeship, of which 467 are women.
“Formal” Apprenticeships

The STEP Skills Survey sample is generally not covered by the 2012 National Apprenticeship Program reforms, since most respondents completed their apprenticeship many years before the 2013 survey was fielded. This raises the question of what being in a “formal” apprenticeship means in the context of the survey, and how it relates to “formal” apprenticeship as it is understood in the National Apprenticeship Program framework. The survey asks respondents who have completed an apprenticeship: “Was this a certified (formal) apprenticeship or an informal apprenticeship?”, leaving the determination of formality relatively subjective.

Apprenticeships identified as “formal” by survey respondents are not significantly longer than informal apprentices on average (33.9 months vs. 30.5 months). However, formal apprenticeships are more likely to result in a certification than informal apprenticeship (35.2% vs. 8.2%). The majority of formal apprenticeship completers still do not receive a certification. Notably, a higher share of female respondents who complete an apprenticeship have completed formal apprenticeship than men (21.3% vs. 14%).

Results

To test the association of a formal apprenticeship with subsequent wages, we first test a simple OLS model in both levels and logs. A dummy variable indicating that a respondent completed a formal apprenticeship is included, along with an interaction between formal apprenticeship and gender dummy variables. The coefficient on the interaction term identifies the gender disparity in the wage effects of a formal apprenticeship. Standard control variables for a Mincer wage regression are included, as well as an indicator for whether the respondent speaks Akan.

In both the log and level versions of the model, a formal apprenticeship is associated with reduced earnings for men, although the marginal effect is statistically insignificant for logged wages. The interaction coefficient is positive, so that the total effect of a formal apprenticeship for women is close to zero. The log model suggests that women in Ghana who have completed an apprenticeship are paid 31% less than comparable men. Coefficients on other Mincer wage equation characteristics, including education and age, are small and generally insignificant, although they are appropriately signed.

Table 4: OLS wage equations for Ghanaian apprenticeship completers.

<table>
<thead>
<tr>
<th>Ln wage ($)</th>
<th>Wage ($)</th>
</tr>
</thead>
</table>

125
Although the OLS regression in Table 1 is informative, it does not account for selection into employment. Table 2 presents the second stage of a selection model, which corrects for selection into employment and is identified by functional form. The results of the selection model are broadly similar to the OLS results, with a negative impact of apprenticeship formalization on men and no net impact on women. In the selection model, women earn 40 percent less than men.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coef.</th>
<th>Std. Err</th>
<th>Coefficient</th>
<th>Std. Err</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.13</td>
<td>1.364</td>
<td>2.82</td>
<td>11.762</td>
</tr>
<tr>
<td>Formal</td>
<td>0.24</td>
<td>0.185</td>
<td>-3.28*</td>
<td>1.843</td>
</tr>
<tr>
<td>Formal*Female</td>
<td>0.24</td>
<td>0.233</td>
<td>3.36</td>
<td>2.330</td>
</tr>
<tr>
<td>Female</td>
<td>-0.40***</td>
<td>0.103</td>
<td>-2.83***</td>
<td>1.028</td>
</tr>
<tr>
<td>Married</td>
<td>0.06</td>
<td>0.095</td>
<td>0.80</td>
<td>0.924</td>
</tr>
<tr>
<td>Akan</td>
<td>0.23**</td>
<td>0.107</td>
<td>0.42</td>
<td>1.067</td>
</tr>
<tr>
<td>Education (yrs)</td>
<td>0.03**</td>
<td>0.014</td>
<td>0.13</td>
<td>0.136</td>
</tr>
<tr>
<td>Tenure (mnths)</td>
<td>0.01***</td>
<td>0.001</td>
<td>0.03**</td>
<td>0.014</td>
</tr>
<tr>
<td>Tenure, sq</td>
<td>0.00*</td>
<td>0.000</td>
<td>0.00**</td>
<td>0.000</td>
</tr>
<tr>
<td>Age</td>
<td>0.01</td>
<td>0.037</td>
<td>0.05</td>
<td>0.058</td>
</tr>
<tr>
<td>Age, sq</td>
<td>0.00</td>
<td>0.000</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

These results are puzzling. Apprenticeship formalization is expected to improve wage outcomes, or at least not reduce them. One of the obstacles to raising wages is that formal apprenticeships do not make a significant impact on graduates’ access to formalized employment. Men who complete formal apprenticeships are somewhat less likely to work in an informal job than men who complete informal apprenticeships.
(70.6% vs. 81%), although the gap is much small for women (95.5% vs. 97.9%). The relationship between a formal apprenticeship and self-employment is similar. Frazer (2006) argues that weak certification of skills can result in apprentices gaining skills that can only be used in self-employment, which is less formal and can pay less. Men who complete formal apprenticeships are self-employed at rates approximately 15 percentage points lower than men who complete informal apprenticeships, while women’s rate of self-employment is only 3 percentage points lower for formal apprenticeship completers than informal.

Table 3: Informal jobs and self-employment for Ghanaian apprenticeship completers.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal apprenticeship</td>
<td>70.6%</td>
<td>95.5%</td>
<td>44.9%</td>
<td>83.3%</td>
</tr>
<tr>
<td>completers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal apprenticeship</td>
<td>81.0%</td>
<td>97.9%</td>
<td>59.1%</td>
<td>86.3%</td>
</tr>
</tbody>
</table>

These findings suggest that the National Apprenticeship Program should investigate how apprentices connect to work after completion of an apprenticeship.

**Literature**


An investigation on the implementation of Modern Apprenticeship between higher vocational colleges and enterprises in China

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Summary: This article shows the result of investigation on the implementation of Modern apprenticeship in 16 Higher vocational colleges in China. The investigation contains members' qualification system, the contract mechanism, curriculum system, the teachers, investment style and so on, and the result shows that “Act according to circumstances”, “Normative procedure” and “Multiple subjects” are the main experiences, “Lacking of government action”, “Partial cooperation”, “Lacking of system and standard” are the main deficiencies. The advices include highlighting the importance of government and guild, making the popularize plan in the range of local area or even whole country and intensifying the system building.

Keywords: Modern Apprenticeship; Higher vocational college; Implementation; Investigation

Introduction

In 2014, China's Ministry of Education decided to implemented Modern Apprenticeship between enterprises and vocational colleges, and choose 165 experiment units, which contains government, vocational colleges, enterprises and trade association, as pilot program members. The Ministry of Education hoped to gain the experience from the pilot program in order to introduce relevant policies in the whole country in the future. During 3-year experimental period, different cooperation units have created variety kinds of experience on qualification system, quality control, curriculum and so on, and also some problems have been exposed. So several questions have been raised: How is the result of implementing Modern Apprenticeship between higher vocational colleges and enterprises in China since the government started to promote from 2014? What is the experiences and deficiencies during this process? What are the reasons for these
deficiencies? What should we do next? Answering these questions needs a comprehensive survey.

**Methods and Research Design**

1. **Research Objects**

The research objects are the members of “The Research Centre of Modern Apprenticeship in China”. These members are the vocational colleges in different areas in China and all participated in the pilot program. These colleges are located in 13 provinces which have 6 colleges in East China, 3 in Central China and 7 in West China. All the colleges are public-run vocational colleges.

2. **Research methods**

In order to collect enough information and data, the Textual analysis and Semi-structural interview were both used. This research collected 16 reports which recorded the details of implementation of Modern Apprenticeship during past 2 years, and these reports have been analysed from different aspects such as the features of majors and enterprises, the curriculum design, the features of the teachers in colleges and the masters in enterprises, the evaluation for apprentices and so on. The aim of using Semi-structural interview is to find out the reasons of the deficiencies, and the action motivation of the government, colleges and enterprises.

**Results**

1. **Majors enrolled in Modern Apprenticeship**

The majors in higher vocational colleges, which enrolled in Modern Apprenticeship, are all equipped with high level technology and the experience of cooperated with enterprises. 4.76% majors are Agricultural and husbandry majors, 57.15% are Manufacturing majors, 33.33% are service majors and 4.76% are related to cultural and creative industries. The reason why colleges choose these majors as trail majors is that the industries related to these majors have new requirement on employees such as rich practical experience, innovation ability, and the traditional cultivation way cannot keep up with this new demand.

2. **Enterprises enrolled in Modern Apprenticeship**

The enterprises, which are enrolled in Modern Apprenticeship, are at least mid-sized, because these enterprises have sustained labour demand, which have ability to establish lasting relationships with vocational colleges. These enterprises contain state-owned enterprises, private enterprises and Sino-foreign joint venture, and most of the enterprises (98%) are in local area.

3. **Cooperation form**
The cooperation was mainly held directly between colleges and enterprises without the participation of government and trade. Sometimes the trade masters are also the partnership. The main cooperation way is “the integration of recruiting students and workers”. It means that the enterprises will recruit workers from new students in vocational college every year, and the recruited students will be regarded as prospective employees. After 3-year or 4-year study in school and enterprise, these prospective employees can turn to regular employee based on the voluntary principle. This form reduces the uncertainty of hiring employees and unemployment rate.

4. Agreement among stakeholders

The agreement was widely used between multiple subjects to ensure the rights and obligations of enterprises, colleges, students and other stakeholders. Each stakeholder has different rights and obligations (Table 1). Most of agreements have legal effect and all stakeholders will be bound by the agreements, but there is no state-level specific law to regulate the behaviours.

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Rights</th>
<th>Obligations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocational college</td>
<td>Non-equity R&amp;D collaboration; Hiring apprentices; Apprentices Evaluation.</td>
<td>Planning the specialty distribution and setting specialties reasonably; Sending excellent teachers; Providing classes management.</td>
</tr>
<tr>
<td>Enterprise</td>
<td>All the due rights for students; Insurance and benefits during internship.</td>
<td>Developing personnel training programs and teaching plan, Providing the training conditions, Compiling text book, Granting awards and so on.</td>
</tr>
<tr>
<td>Apprentice</td>
<td>All the due rights for students; Insurance and benefits during internship.</td>
<td>Observing rules and regulations; Finishing school on time.</td>
</tr>
<tr>
<td>Parents</td>
<td>Impelling performance; Participating in the decision-making of related matters.</td>
<td>Supervision and Administration in daily life.</td>
</tr>
</tbody>
</table>

5. Curriculum system

Modularization curriculum is the main form of curriculum system, which contains three kinds of modules: basic module, core module and enterprise module. The basic module contains common required courses, professional basic courses and professional basic skill courses. The core module contains several professional core courses which can embody the professional characteristics. The enterprise module contains several courses which meet the enterprises’ needs. This system can balance the multivariate demands and take advantage of flexibility. The enterprises can put unique knowledge such as the cutting-edge technology in the factory, enterprise culture into the curriculum, and update conveniently.
6. Teachers and apprentice evaluation

“Dual-tutors” is regarded as a useful form for colleges and enterprises to train students or apprentices. The “dual-tutors” contains teachers in colleges and masters in enterprises. The vocational colleges and enterprises conclude the contract about the qualification of teachers from schools and masters from enterprises to ensure the teaching quality. The college teachers are also asked to join the “workplace learning plan” in enterprises in order to improve their knowledge and ability. Now the ratio of apprentice to master is less than 6:1.

The multi-subject evaluation is widely used in Modern Apprenticeship. The subject of the evaluation includes the apprentices, masters from enterprises, teachers from colleges and even masters from trade. The method of evaluation includes making a specific work, writing an essay, attending a written test, giving a presentation or attending certificate of qualification. The evaluation result will be converted into credits, which may affect their graduation and employment in the future.

7. Management and investment pattern

The Joint management pattern are used in dealing with the daily management. The management committee is the high Authority, which contains the staff from colleges, enterprises and even guilds. The management committee is responsible for overall design and management, and a number of sub-committees are set up for solving specific questions such as curriculum design, teaching arrangement, the hire and evaluation of apprentices and so on.

Both colleges and enterprises invest into Modern Apprenticeship by different purposes. The colleges pay more attention to students' scholarship, rewarding excellent teachers, offering transporting, catering and communicating grants for apprentices, developing curriculum, but the enterprises focus on internship salary, offering transporting, catering and communicating grants for apprentices, purchasing training equipment and materials, rewarding excellent masters.

Conclusion

1. The features and experience of implementing Modern Apprenticeship pilot program

(1) Act according to circumstances. The Modern Apprenticeship has showed different forms and features in different areas due to the multiple conditions, and vocational colleges and enterprises adopted the proper way to build a durable relationship on talent cultivation. For example, on choosing the majors, colleges focus on occupations which have complex technology and production situation and need more theoretical knowledge, experiential knowledge, methodological knowledge (Zheng Li, 2017) or even professional knowledge (Felix Rauner, 2011). (2) Normative procedure. In the past, the school-enterprise cooperation in vocational education in China was lack of normative procedure to regulate rights and obligations, but now the agreements are widely used between
multiple subjects in Modern Apprenticeship, which contains spirit of contract in modern society. (3) Multiple subjects. In Modern Apprenticeship, the vocational colleges, enterprises, trade, apprentices, and even their parents are all involved, which is benefit for building a strong cooperation mechanism.

2. The deficiencies exposed in implementing Modern Apprenticeship pilot program

Obviously, the absence of government responsibility such as funding apprentices for participating in off-duty training (ILO & World Bank, 2014) is a big problem, and the whole process is lacking of government action such as governing or financial supporting. Also, the cooperation between colleges and enterprises are all happened in the local place from point to point, and there is no authoritative, unitive standard widely used in local area, which limit the cooperation in the long run. Last but not least, the whole process is lacking of essential micro systems which support the operation of Modern Apprenticeship.

At present stage, highlighting the importance of government and guild, making the popularize plan in the range of local area or even whole country and intensify the system building are three improvement measures for all stakeholders.

Literature

