

**Vocational and Technical Education from a Transatlantic
Perspective:**

Ample changes and opportunities for collaboration

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Bosch XXXII

May 2016

Introduction

Having worked as a teacher and in education policy in the U.S. for more than ten years with a focus on improving education and opportunities for all students, but especially for poor and minority students, one thing is clear: there are not enough career-related paths. The unrelenting focus on “college for all” policies has ignored the economy’s need for middle-skilled workers (i.e., those with more than a high school diploma but not a full-fledged Bachelors’ degree). This has resulted in students, recent graduates, and college dropouts with scandalous amounts of student debt but no jobs. Simultaneously many companies, including many German companies (Vater & Michels, 2015), are unable to grow their operations in the U.S. market because of a lack of qualified applicants and the high costs of on-the-job training. The manufacturing, healthcare, finance, and technology sectors are strongly affected by this skill and training mismatch. As a result of this situation, there is considerable interest to learn from the German approach to vocational education but is it a viable model for the U.S. and is it as good as it looks from the outside? Also, what about the fast-paced tech sector, does vocational training really apply?

Germany is globally renowned for its duale Ausbildung approach to vocational education for its 340 different career profiles (Federal Ministry of Education and Research, 2013). In short, this refers to the two parts of training a trainee receives: the firm-based practical training and the school-based theoretical training. Typically after they complete high school, vocational students will have three years of a systematic and standardized approach to both the firm- and school-based training, and will need to pass standardized written and practice-based exams to receive a nationally recognized certificate. During my first stage I was fortunate to be at the DIHK (Deutscher Industrie- und Handelskammertag) where I learned more than I could have imagined about how the duale Ausbildung approach actually works, the multiple actors involved, and current trends, as well as how the DIHK and their AHK affiliates abroad are actively exporting the model.

Through my second stage, at CareerFoundry (CF), I discovered more about the development of technical skills that are high in demand. CF offers online tech courses for people wishing to begin or further their skills in careers such as: web developers, user experience designers, user interface designers, and soon iOS developers (don’t worry if these are foreign terms, they will be defined below). With Berlin’s vibrant Start-Up Scene lovingly known as “Silicon Allee,” the widespread development of these skillsets is necessary for this sector to continue grow. Similarly, in the U.S., there are simply not enough people with these skills, which has fueled a movement to include coding classes as a high school graduation requirement and a growing sector of technology education providers. Are these tech skills effectively the vocational skills of tomorrow? Does the fast changing pace of the tech world require a different approach to training? Can online offerings really offer a path to a new career?

The following paper is informed by my experiences at my two Stage institutions and from my research on these topics. In the first section, I address the history and current trends surrounding vocational education in the U.S. and Germany. In the next section I analyze what I have learned by working at a startup focused on tech skills, the trends in this area, and what needs to be done to address the shortage of “techies.” The Appendix includes a paper I wrote for DIHK about why their affiliates abroad are ideal partners for creating dual vocational training outside of Germany.

PART 1: Vocational Education in the U.S. and Germany: Now, in the Past and Trends

The U.S. is considered to have a “liberal skill formation” system where skill training happens via markets and in the general education system, which typically does not have strong links to employers (See Table 1). Students usually receive a general secondary education in a comprehensive high school, do an internship or have a summer jobs and then participate in on-the-job training after high school graduation. There are also some public vocational programs; however, they have a lower status than the general or academic tracks, leaving higher-level vocational training to community colleges or trade schools where students have to pay for their training and there are limited connections to industry (Busemeyer & Trampusch, 2011, p. 13).

Table 1.1: Categories of Skill Formation Systems

	Involvement of Firms in Initial Vocational Training	
	Low	High
Public Commitment to vocational training	Low	Collective Skill Formation (Germany)
	High	Segmentalist Skill Formation (Japan)

Source: Busemeyer and Trampusch (2011). Table 1.1, page 12.

Although 67 percent of U.S. comprehensive high schools offer some vocational classes, most students only take one or two classes. Vocational high schools where students are more likely to take more vocational courses and leave with a credential educate less than five percent of high school students. Similarly, regional vocational centers, where students go solely for vocational courses while attending comprehensive high schools for their academic requirements, are attended by six percent of high school students (Silverberg, Warner, Fong, & Goodwin, June, 2004, p. 21).

As Kathleen Thelen argues, the history behind the U.S.’ more “liberalized/non-coordinated” market economy versus Germany’s “organized/coordinated” capitalist economy explains why the process of skill formation is so different in the two countries (2004, pp. 2-3). The history of skill formation including vocational education in the U.S. was heavily influenced by a weak presence of craft organizations early on (such as guilds), high mobility, mass immigration, and an emphasis on white collar management of lower-skilled workers (Thelen, 2004, p. 177).

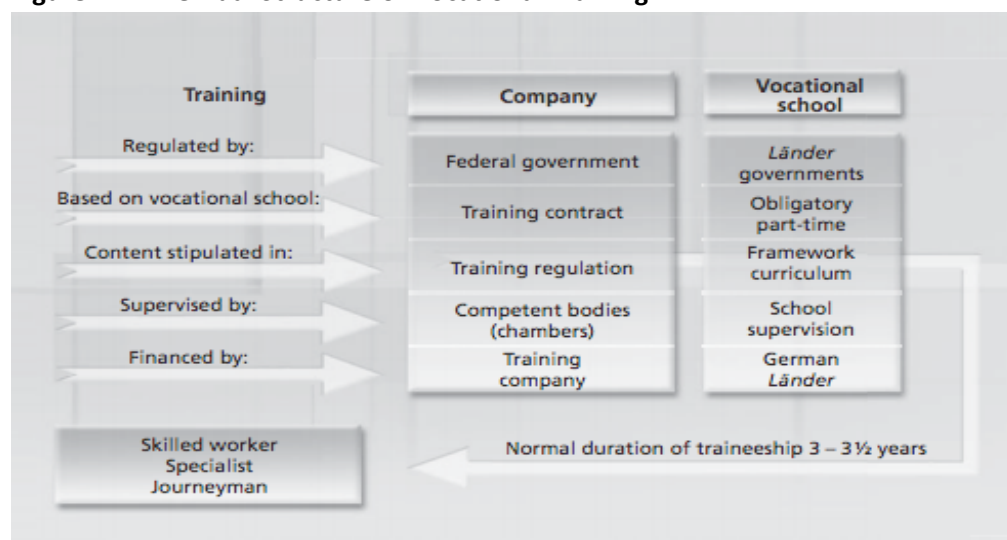
The focus on white collar management of semi-skilled workers made the vocational route even more unattractive to students in the U.S. because the ability to climb the career ladder was only available to those with a high-level high school or college background (Thelen, 2004, pp. 210-211). As a result, vocational education has a very low-status (see for example: Symonds, Schwartz, & Ferguson, February 2011, pp. 28-29; The Economist, 2010; Thelen, 2004, pp. 210-211). This has also played a role in the “excellence for all” agenda in the U.S. where all students are expected to graduate high school ready for college and careers (which are considered to need the same level of preparation). (Hess, 2010, pp. 16-22).

The focus on preparing all students for college is also a challenge because many young people graduate from high school or college without specific skills or work habits and are unable to find work (Symonds et al., February 2011). Those who do find work usually have to receive on-the-job training. U.S. employers spend \$400 billion per year on both formal and informal training for their employees, often after they have already completed some post-secondary education (Carnevale, Jayasundera, & Hanson, 2011, p. 6).

In Germany, the business community has a long history of involvement in vocational education at the secondary level. Germany's coordinated vocational training system is considered "collectively organized" because of the involvement of firms, intermediary associations, and the state in vocational training. In this system, firms are heavily involved in the financing and actual administration of the training, intermediary organizations such as unions or employer associations are also involved in the administration and ongoing reforms of the training. Trainees receive portable, certified occupational skills, and the training itself takes place in both schools and companies. (Busemeyer & Trampusch, 2011, pp. 4-6).

Germany is well known for its "dual system" of training where students simultaneously complete an apprenticeship and attend a vocational school. To say it is a system however, where a student works while simultaneously going to school, woefully underestimates the systematic elements of the training. Dual vocational education in Germany falls under the legal provisions of the Vocational Training Act of 1969/2005 (Berufsbildungsgesetz- BBiG). Under this law, vocational education providers (i.e. the firms) need to meet legally binding standards and must provide the apprentices a set of occupational experiences, as written in the training regulations, so that they will be fully prepared for their jobs. It further delegates the administration, monitoring, and examination to the Chambers of Commerce (Industrie und Handelskammern- IHK) and other competent bodies (i.e., Handwork Chambers) while the school portions are governed at the state- (Länder) level. Unions also have representation in the IHK training committees and on the state and federal level committees (Bundesinstitut für Berufsbildung, 2010, pp. 3-6).

Figure 1.1: The Dual Structure of Vocational Training



Source: Bundesinstitut für Berufsbildung (2011), p. 9

What does this all mean for someone who is going through one of Germany's more than 300 recognized dual vocational education and training programs? Their program is highly standardized, meaning that the skills and competencies they acquire in firm Y in the first year, they would also have acquired in firm X in the first year. At the end, when they have finished the prescribed amount of time and experiences required and they have passed their exams, which have theoretical and a practical portions, they will have a certification that is recognized throughout Germany (Bundesinstitut für Berufsbildung, 2010, pp. 3-6).

As one might imagine, this requires a lot of collaboration and coordination among the federal and state-level governments, the companies, and the unions. From a company perspective, this means a lot of extra work in terms of participating in vocational training committees, having all of the required training aspects in-house or providing for it otherwise, paying for an apprentice who cannot be very productive in the beginning and is often not there because of school requirements. But from a company perspective, it also means having a qualified workforce with up-to-date skills and competencies.

About half of all German students participate in vocational education, most of them in the dual system of learning (Hensen & Hippach-Schneider, November, 2012, p. 16). For students in vocational education programs in Germany, 41.5 percent of their educational expenses are funded by non-public sources including businesses involved in vocational training (Autorengruppe Bildungsberichterstattung, 2014, p. 35). In 2010, the contribution of companies towards vocational education was estimated to be Euro 7.7 billion (KMK, 2014, p. 81).

Germany's system is often referred to as a best-practice model of vocational education. This is especially the case when comparing the youth unemployment rates- those aged 15-24 who are not going to school or university and not in the workforce. Germany's 2014 youth unemployment rate was 7.8 percent or about half of the U.S. rate of 13.4 percent (OECD, 2016). The American interest in Germany's vocational education system was also recently expressed in President Obama's 2013 State of the Union Address when he said "Let's also make sure that a high school diploma puts our kids on a path to a good job. Right now, countries like Germany focus on graduating their high school students with the equivalent of a technical degree from one of our community colleges. So those German kids, they're ready for a job when they graduate high school" (Obama, 2013).

Despite the overwhelming positive perception of Germany's dual system it is quickly losing its luster in Germany itself. Why is this and what has led to this situation? Thelen and Busemeyer (2011) identify some troubling trends. One such trend is the 27 percent decline in the firms that participate in apprenticeship training. There is tremendous variation in this number with traditional manual sectors such as construction, consumer goods, and mining having the largest decline in firm participation. Across all three major sector categories (manual, traditional service, new service such as IT), there were large decreases in the participation of small firms. This has led to a shortage of apprenticeship positions with the weaker students having to take places in the "transition system." This system is a "patchwork system of state-sponsored training, education, and labor market measures" (p. 77). The intent is that this training will only be a short-term solution until the student does find an apprenticeship placement but many students remain in the transition system for longer periods of time (pp.75-77). They further argue that the collective skill formation model is slowly evolving into a segmentalist model because of the domination of large firms in the apprenticeship system and the desire of the state to appease them for fear of losing more apprenticeship places. In a

segmentalist model, firms are more focused on their own independent needs rather than the overall standard skill set required by the traditional certification process. This is also abetted by the ongoing weakening of central collective bargaining and a decrease in union membership (Thelen & Busemeyer, 2011, pp. 75-84).

German Vocational Education in a Changing Germany

The dual vocational education programs in Germany can have enormous benefits for the apprentices, namely an income while learning, a direct tie to industry, a high chance of being hired at the completion, and a nationally recognized occupational certificate. For companies, the benefits include having skilled-workers with the exact skills and training needed, savings on recruiting costs, increased productivity during the training, and more company loyalty (Bundesinstitut für Berufsbildung, 2015). Regardless of all of those benefits, both companies and pupils are turning away from this world-renowned system like never before. In 2013, for the first time ever, more students decided to go on to university than those going on to a vocational training program (Autorengruppe Bildungsberichterstattung, 2014, pp. 99-101). Here I explore some of the major reasons behind this trend, namely changes in: demographics, educational preferences, German vocational education policy, and major shifts in the economy.

A) Demographics

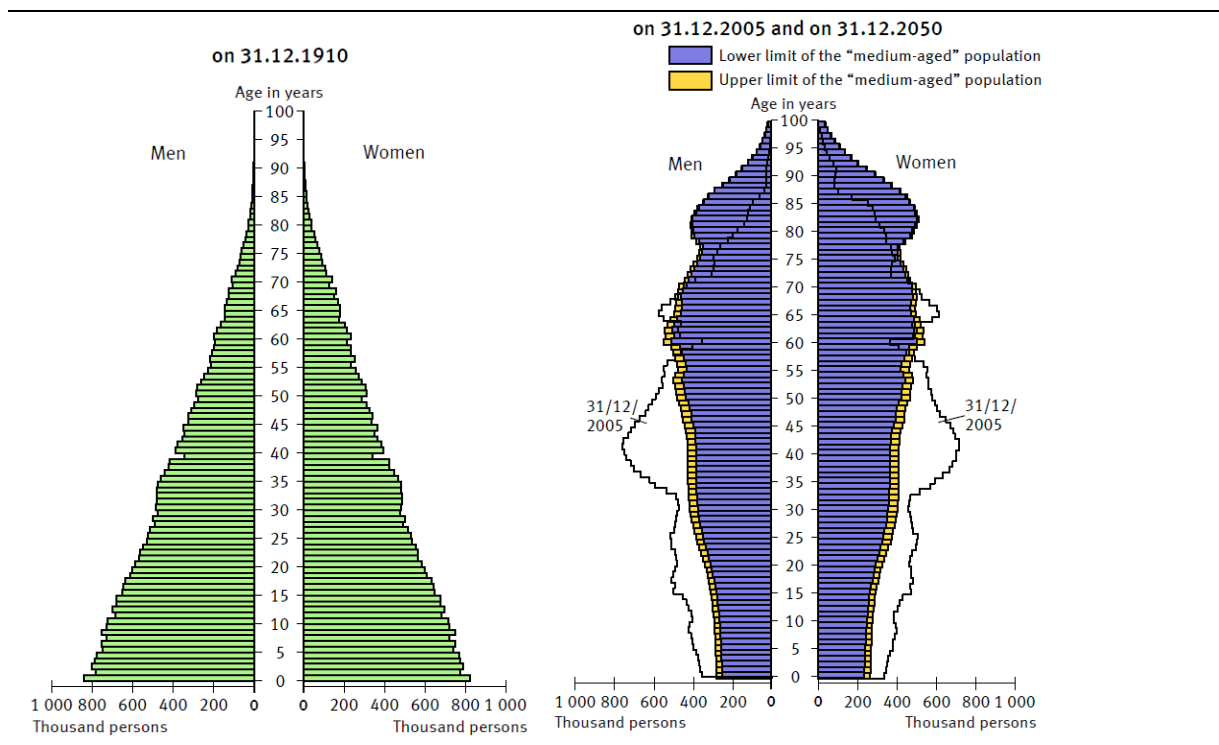
Germany has a declining population because of extremely low birth rates and until recently low immigration. When one looks at the age structure of the population in Germany in 1910 and compares that to today in what some researchers call the pyramid and döner models (think big piece of lamb in Turkish restaurant), it is striking to see the decline of the youth population (Eisenmenger, Pötzsch, & Sommer, 2006). Although this will be offset to some degree by migration, it has and will continue to have many consequences but most relevant for this paper is the effect this is having on secondary and postsecondary options and long-term employment trends.

From an education perspective, this has meant a decline in the number of school graduates of all kinds. Traditionally Germany has had a three track secondary school system: the Gymnasium for those likely to go to university, the Realschule for those likely to do higher-skilled vocational jobs, and the Hauptschule for those likely to do lower-skilled vocational jobs. Gymnasium was extremely selective in 1955 with 16 percent of students attending, however that has changed drastically- by 1995 31 percent of students attended (Nikolai & West, 2013, pp. 61-62) and today 34 percent of students attend Gymnasium¹ (Malecki, 2016, p. 13). Part of this can be attributed to the changing education preferences of this generation and the long-term employment prospects, which will be discussed below, but part of this is due to the decreasing size of the school-aged population. In other words, although the percent of graduates leaving with an Abitur (graduation degree typically after Gymnasium) increased greatly, the absolute number did not because of shrinking cohort sizes (Jacob & Solga, 2015, p. 163). With this in mind, it is hardly surprising that the other end of the secondary school spectrum, the Hauptschule has dwindled from serving 74 percent of students in 1955 year to 24 percent of students in 1995 year (Nikolai & West, 2013, p. 60) and today 12 percent of students

¹ Note: these statistics do not include or reflect the reforms that have been made that created additional forms of school, which also offer paths for students wishing to go to university such as the integrated secondary schools- now about 16 percent of students.

attend a Hauptschule (Malecki, 2016, p. 13). From an education and career path perspective, this has led to higher proportions of students going to higher education and a much lower proportion going the vocational route, leaving employers scrambling to find Azubis (nickname for dual vocational participants).

Figure 1.2: Age Structure of the Population in Germany



Source: Eisenmenger, Pöttsch, & Sommer (2006), p. 16, Figure 3.

B) Changing Educational Patterns

In addition to the demographic trends described above, the educational preferences among German youth have changed drastically over the last decade. As mentioned above, for the first time ever, in 2013, the percent of students going on to higher education institutions exceeded the percent of students going to vocational education programs (Autorengruppe Bildungsberichterstattung, 2014, pp. 99-100). When asked if they wanted to go to higher education or do an apprenticeship, just 47 percent of students completing high school in 2012 said they wanted to go on to do a duale Ausbildung (Bundesinstitut für Berufsbildung, 2013b, p. 75). Part of what is driving this is changes in the economy (more on that below) but part of it is also a cultural shift that values higher education above all else and the perception that higher education leads to better career chances, higher income, and societal prestige. These changes in preference are also reflected in the high percent of students going on to and completing higher education. In 2000, just 18 percent of young Germans received an academically focused upper-postsecondary degree (tertiary type A) compared to an expected 30 percent in 2012 and at the same time, the income gap between those with higher education and those without has grown (OECD, 2014, p. 4). Basically vocational education has started to have an image problem, which it may have earned in some sectors.

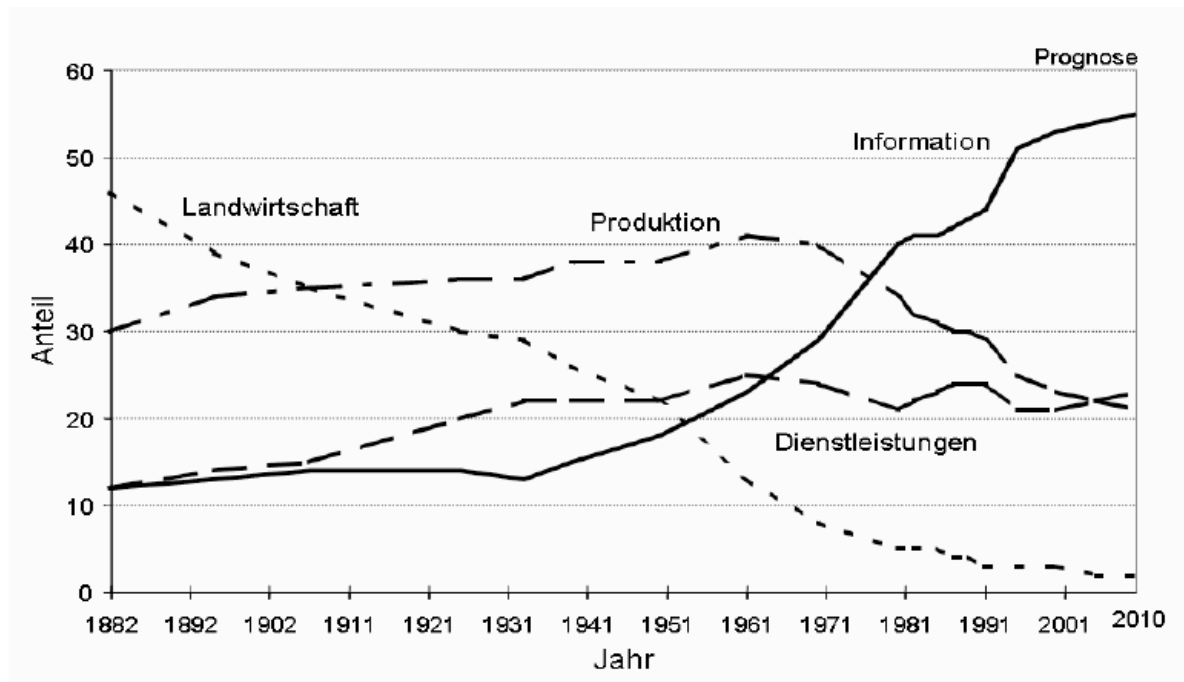
While we in the U.S. look across the pond with envy of the high quality vocational programs, the reality is that not all dual vocational training programs are created equal. When comparing the

completion rates of different dual training programs, it becomes obvious that the dual system has major advantages for some careers but for others, it is less pronounced and less certain if someone will complete the training. For example: roughly six percent of those in training to be a banker or bank clerk (Bankkaufmann/frau) leave their training before it is completed compared to 49 percent of those who are training to be a cook (Koch) (Bundesinstitut für Berufsbildung, 2013a).

These differences in completion rates also reflect a shift within the dual vocational education system with ever less people in craft apprenticeships and more in the industrial and commercial apprenticeships, which often require the Realschule or the Abitur for entry. To account for the losses in some of these less desirable job types, employers and vocational schools have increasingly had to hire and train people that traditionally would not have qualified for vocational training, such as those with very low levels of achievement. This has also led to an increase in the number of candidates participating in prevocational training or the transition system before starting their actual vocational program (Jacob & Solga, 2015, pp. 164-165), however, there is not always a smooth transition to dual vocational training as some students remain in the system for extended periods of time (Baethge, Solga, & Wieck, 2007, pp. 21-22; Hoeckel & Schwartz, 2010, pp. 20-22). After intense focus however, the percent of students going on the transition system has decreased by about a third in the last decade from 36.3 percent of those going on to vocational education to 26.3 percent (Autorengruppe Bildungsberichterstattung, 2014, p. 98). These alternative ways to vocational education may be causing vocational education options to be less attractive in general.

C) Globalization/Changing Economy – Industry is the focus here

Another major trend changing the supply and demand structure of German vocational education has been the shift from an industrial-based economy to more of a service- and knowledge-based economy. Germany has long been known for high-quality manufacturing, and chemical and electronic products. With a focus on production processes that require a higher level of knowledge and craft rather than mass production, having a well-trained workforce is paramount. In this way, the duale Ausbildung is a perfect fit; however, as the German economy (like many economies) has shifted and continues to shift towards the knowledge economy or away from the physical work of making things to the intellectual work of immaterial services, knowledge, creativity, ability to work with information and communication skills are valued above all else. These are exactly the competencies higher education has long provided and another reason behind the major shift away from vocational training towards higher education (Baethge, 2006). The chart below shows how the information and service sectors have grown while the production and farming sectors have declined.

Figure 1.3: The Four Sector Model from 1882-2010

Quelle: Dostal 2001.

Source: Dostal 2001 in Baethge 2006, p. 13. Note: Agriculture (Landwirtschaft), Dienstleistungen (Services), Production (Produktion) and Information.

In the “new” economy where there is tremendous pressure towards lower prices, ever better technology, catering to differentiated customer demands, and high quality all with improved customer service, companies have had to adjust by going from traditional functional/occupational organizations of work where work is centered around technical skills and tasks to work patterns that are structured around the needs of customers and processes. This requires significant amounts of cross-functional cooperation on various levels of hierarchy and much more flexibility across divisions. In function this means that the boundaries between departments within firms are not as rigid and the firms become less hierarchical. For the workers this means having to do many different types of tasks of differing levels of complication and responsibility; which lends itself to people with broader abilities. In short, a service- and knowledge-based economy relies on employees with broader bases of knowledge than those with a specific vocational training for a specific job because the work tasks require more formal qualifications than the experience and imitation techniques inherent in dual training. This explains why many companies are increasingly hiring college graduates and offering less dual training opportunities (Baethge & Baethge-Kinsky, 2003). With these major economic shifts, Germany’s vocational policy and practices have also been changing.

D) Changes in German Vocational Education Policy and Practices

Policymakers in Germany are well aware of the issues facing Germany’s vocational training system and the impact it will have on the economy. Over the last fifteen years or so they have come together with industry leaders, chamber organizations, union leaders, vocational school personnel, and others to decide what changes they could make to the vocational system to make it more: accessible to disadvantaged students, attractive to higher performing students, and flexible to today’s fast-paced economy.

As a reaction to many of the changes mentioned above and the actors concerned, the Vocational Training Act of 1969 was amended in 2005 to allow for:

- Flexibility within the training to allow additional courses, part-time options and a clarification of minimum requirements but also the provision for including additional qualifications
- The ability to transfer credits from school-based vocational education into dual training programs
- The possibility to do portions of the vocational training abroad
- A modernization of the exam process and to allow the Chamber exam to be given to people who did not do the initial vocational training (all within state-level discretion) (Bundesinstitut für Berufsbildung, 2005)

Companies and higher education institutions have also reacted to the major changes in the economy and the preferences of students. The desire among companies to have employees with increasingly higher and broader levels of knowledge along with increasing demand from younger generation of Germans for a higher education degree is fueling the creation of “duales Studium” programs, where upon completion of an Abitur or a comparable qualification, apprentices work in the firm and attend a higher-education institution in pursuit of a bachelors degree. There are basically two forms of “duales Stadium.” There are those that are aligned to an Ausbildung and include all of the rules and regulations of the traditional dual Ausbildung but at the end the trainee receives both a bachelor’s degree and an IHK Ausbildung certificate. Then there are those that are considered near to practice and are not subject to all of the rules and regulations of the dual Ausbildung but the trainee receives just the bachelor’s degree at the end. In both cases there is a work- and higher education-based component. The number of these programs Germany-wide has tripled in Germany going from just over 500 different programs in 2004 to over 1500 in 2014 while the number of students enrolled in these programs has more than doubled in the same amount of time (Bundesinstitut für Berufsbildung, 2014). These programs allow employers to attract high-achievers early on and to avoid the costly problem of providing them a duale Ausbildung only to have them leave for a higher education institution at the end (Jacob & Solga, 2015, p. 168).

Do Duale Ausbildung Programs Make Sense for the U.S.?

So what do all of the changes in the German system mean for the U.S.? Does it make sense to even try to start such dual vocational programs when in Germany they are declining? In my opinion and from the research and data I have seen, I say yes on all accounts. In short, here is why:

The United States is experiencing a major “onshoring” of manufacturing. After decades of watching jobs, especially those in manufacturing move out of the U.S, we are actually seeing a return of these jobs to our shores, to the tune of 60,000 of these jobs each year (Cheng, 2015)². While this is an exciting turn for us from an economic perspective, there are also many challenges and one of the biggest is the lack of a skilled workforce. Unlike the dirty, low-skilled manufacturing jobs that left us over the decades, the returning jobs are in high-tech manufacturing. Because we had been shedding

² See Cheng also fort he many reasons manufacturing is returning (i.e., lower energy costs, a need to be closer to consumers, patriotism, rising wages in China, shipping issues).

jobs in manufacturing all of those years, we did not bother to keep up with the changes in manufacturing and did not prepare enough people for these new middle-skill jobs; which are expected to grow substantially in the coming years (Carnevale et al., 2011; Webster, 2014). Because Germany was able to hold on to its manufacturing jobs and had focused on more highly-skilled production models and the training they require, learning from their vocational training methods will be paramount to us continuing to onshore manufacturing and to weather the expected digitalization in this sector.

It is also important to note that while manufacturing is coming back fast, there is also a growing need for middle-skill employees in sectors such as health care, technology (see below), and banking (Burrowes, Young, Restuccia, Fuller, & Raman, 2013). From a transatlantic perspective, it will also be critical to the growth of German employers in the U.S. as 65 percent of them stated that one of the main inhibitors of growth in the U.S. market is a lack of enough qualified applicants (Vater & Michels, 2015).

From an individual young person perspective, dual vocational training may be an attractive option. U.S. education policy over the last 30 years has been focused on college-for-all. While noble in its goal, the reality is that of all first-time, full-time freshman at four-year higher education institutions, just 59.2 percent graduate with a BA six years later. For African-American and Latino students, the six-year rate is 40.2 and 51.9 percent respectively (U.S. Department of Education, 2014). For those in community college two-year programs, just 20 percent complete their degree programs within three years³ (Lerman & Rein, 2015, p. 16). Making matters worse on an individual level is the fact that so many of the college dropouts have no degree but loads of debt. Recognizing the amount of debt they have as students, many students start working or even increase their working hours, making it tougher for them to complete their degrees. Once they dropout they have a higher risk of unemployment and lower earnings. (Nguyen, 2012). Even for recent graduates of four-year institutions, many of them are unable to find work, are working part-time, or are working in jobs that typically do not require a college degree (Burrowes et al., 2013, pp. 5-7).

Although there is clearly a mismatch between employers not finding the skilled people they need and young people struggling to finish college degree programs only to graduate with credentials that are not in demand, a major shift towards a dual vocational system will not be easy! This would be a sea change for students and their parents who see vocational education as having a low status but also for firms, which, traditionally have not invested in the professional development of their employees in a systematic way and expect higher education institutions to “do” the initial training. Regarding these two points, there is a lot to learn from Germany but with the full understanding that we will never simply transfer the model to the U.S.

With vocational education struggling with such a massive image problem in the U.S., we can learn a lot from Germany as they too struggle with an image problem and a declining youth population. Namely, the U.S. should think through vocational models with multiple levels. For example, programs that start at a high school level but that include community college courses and that have clear articulation agreements with four-year colleges. Clusters of companies in a sector can work together with an outside partner (see Appendix) and education institutions to create career profiles

³ Note: does not include certificates

with smooth transitions to higher-level careers and education opportunities. Key to any program that will succeed in the U.S. is for there to be many on and off ramps so that potential candidates know that they can still achieve the goal of a college degree if they so please- that no opportunity has been closed off to them.

We could learn from Germany's growing *duales Studium* programs where apprentices work at the company and are working towards a bachelor's degree at the same time. In most of these programs, there is ongoing input from industry about what needs to be included in the curriculum and the work-based component serves as the practical or hands-on related training (Graf, 2015). *Duale Hochschule Baden Württemberg (DHBW)* is an example of an institution to learn from. With its many *duales Studium* offerings in many locations, big and small throughout the German *Bundesland* its name bares, it offers a glimpse of what is possible when companies come together with higher education to address their needs and the aspirations of young talent. These types of programs could address the debt issues mentioned above and would turn the idea of work as a detractor from higher education to work as a motivating factor. It could also result in fewer people coming out with credentials with little or no demand on the market. While this is exciting, it requires a completely different role for the companies. They would have to train people to be in-house trainers, work closely with higher education institutions, and work more closely with their new employees, not to mention the financial aspects these programs would entail.⁴

Regardless of the approach taken, vocational initiatives with well-integrated work and learning components need to be driven by the companies themselves. In Germany, whether through the *IHKs* or in collaboration with higher education institutions, it is the companies that play a key role in the formation and continual updating (or even elimination) of vocational programs. Government can encourage companies by offering competitive grant programs for companies and higher education institutions that offer comprehensive dual training programs. They can also provide deep tax incentives for companies that offer these programs, perhaps even eliminating or severely reducing the costs associated with vocational and/or higher education.

The good news is that there is a growing resolve in the U.S. to make major changes to the way we approach vocational education and a willingness to learn from countries like Germany. The president's remarks in his 2013 State of the Union address, followed by the memorandum of understanding between the U.S. Departments of Commerce, Labor, and Education and the German government in June of 2015 (U.S. Department of Commerce, 2015), the numerous national education organizations that have turned their attention to or increased their focus on this issue and the small scale programs that are popping up throughout the country, and the American Apprenticeship initiative's \$175 million from the federal government for public-private partnerships are evidence of this (Hanks & Gurwitz, 2016). The true implementation, the winning over of the American public, especially the hearts of parents and students, and the long-run investment strategy of companies lies ahead and will need extreme focus if any of this is to be successful. Luckily we have strong relations with Germany and can benefit from the many partnerships we have.

⁴ Costs may actually be the wrong term- it is a long-term investment in talent

PART 2: Technology Skills: A Global Demand that is Insatiable

Open just about any job listing website and you are bound to find loads of technology jobs with names and job descriptions you can barely understand. Usually one look at the sheer number of acronyms and capitalized letters and foreign sounding words and you know it is a tech job and if you are like me, you skip over them. But why do we see so many of these job ads and how are people picking up these skills? In Germany and in the U.S.?

So first, to demystify, here is a table with a few techie job titles you may have seen and their typical responsibilities.

Table 2.1: Some Techie Jobs and their Responsibilities

Web Developer	Use coding languages such as JavaScript, HTML, and CSS to actually create the website (front end) and/or develops the internal workings of the application or website on a server (back end)
UX Designer UX=User Experience	“enhances customer satisfaction and loyalty by improving the usability, ease of use, and pleasure provided in the interaction between the customer and the product”
UI Designer UI=User Interaction	Concerned with “the look and feel, the presentation and interactivity of a product”
iOS Developer	Develops apps for iOS platform (Apple Products)

Quotes from Emil Lamprecht (2016)

Next, why do we see so many of these jobs? “The main reason for the rapid growth is a large increase in the demand for computer software. Mobile technology requires new applications. Also, the healthcare industry is greatly increasing its use of computer systems and applications. Finally, concerns over cyber security should result in more investment in security software to protect computer networks and electronic infrastructure.” In fact software developer jobs are expected to increase 17% and web developer jobs by 27 percent between now and 2024; which is much faster than the seven percent average predicted growth for all job types (B, 2013; see also: U.S. Bureau of Labor Statistics, 2015).

One would think that with kind of demand for “techies,” higher education institutions would be rising to the cause by churning out more graduates with these in-demand skills but in reality, they are not and the industry changes so fast that the slow moving universities and colleges are unable to keep up. What is completely new as a preferred coding language today could be out of use or close to it in a year or two. Higher education institutions simply do not lend themselves to changing that fast. There is an enormous gap between the predicted industry need for web developers and the output of computer science majors. For example, it is estimated that there are currently about 50,000 computer science graduates each year in the U.S (U.S. Department of Education & National Center for Education Statistics, 2014).; however, according to the White House, there are over 500,000 IT jobs that are currently unfilled (2015) and as mentioned above a growing need for more.

Europe is experiencing a similar situation with unfilled IT jobs expected to reach 825,000 by 2020 (European Commission, 2016).In Berlin with its large startup scene, there is also an enormous need for “techie” talent. In fact, one of the Berlin-based companies we met with as part of our market

research told us that they were looking to hire about 2,000 web developers. With such a great need for a specific type of talent, one would expect there to be a *duale Ausbildung* for this type of job in Germany because there seems to be an *Ausbildung* for just about everything. Indeed there are *Ausbildungs* such as the *Wissenschaftinformatiker*, the *Fachinformatiker/* with a focus on software development, or the *Mediengestalter* for digital and print media. While these are fabulous ways to learn tech skills deeply in a practical way, there are simply not enough of them to meet the growing demand for technology skills. As one of the interviewees said “all businesses are in the tech business today” and therefore all kinds of companies need people with these skills (but few of them actually train people for these positions). Secondly, for many of the startup firms, planning what is happening three months into the future is a big challenge, planning three years out, or the duration of the typical *Ausbildung* is impossible and setting up the structures to make such a program is also challenging for them.

For the reasons mentioned above, there has been significant growth in the “Bootcamp” sector of techie education and other online and offline training options. A bootcamp is a training program that teaches people with little or no coding skills to write code and to build applications in as little as 8-12 weeks but with a focus on the most industry-relevant skills (see for example: Dev Bootcamp, Fullstack Academy, Hack Reactor). Many of these programs boast about 60 to 70 hours a week of intensive coding during this time and the chance to work on projects that one can display in their portfolio (Firehose Project, 2015). There are also several online providers of training. Some offer free courses and online videos (see for example: Code Academy), others charge money for more through course content and some also include interactions with a mentor (see for example: CareerFoundry and Udacity). Career Foundry’s model focuses on both having a mentor but also creating an online community for their students to support each other. These courses are often used by people who are already in the industry as an upskilling experience.

Regardless of how one comes to be a “techie,” almost all of the employers I interviewed as part of my Stage, complained about junior applicants not having enough practical experience. Interestingly, all of the students we interviewed had similar complaints. This points to another hole in the market – if employers really need these skills and want people to have practical experience, it is on them to provide this. This means creating new forms of trainee and apprenticeship programs. There are some good examples of these types of programs in the U.S. (see for example: Launch Code, Detroit Labs, A100) but we need far more if we are ever going to provide the number of IT workers needed on the next decade. The same is true in Germany. Again, as I argued in the section below, this will require businesses to take on a new role of providing educational options and supporting people in these endeavors.

References

- Autorengruppe Bildungsberichterstattung. (2014). Bildung in Deutschland 2012: Ein indikatorengestützter Bericht mit einer Analyse zur Bildung von Menschen mit Behinderungen. Bielefeld: der Ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland und des Bundesministeriums für Bildung und Forschung.
- B, Wendy. (2013). High Demand: The Occupational Outlook for Developers. Retrieved from Intel Developer Zone: <https://software.intel.com/en-us/blogs/2013/06/05/high-demand-the-occupational-outlook-for-developers#>
- Baethge, Martin. (2006). Das deutsche Bildungs-Schisma: Welche Probleme ein vorindustrielles Bildungssystem in einer nachindustriellen Gesellschaft hat. *SOFI-Mitteilungen*, 34, 13-28.
- Baethge, Martin, & Baethge-Kinsky, Volker (2003). The German Model of Production and Training at a Crossroads: Changes of Work Structures (in Enterprises) and Strategies of Human Resource Development: Qualification Change and Competence Management. . In F. Achtenhagen & E. G. John (Eds.), *Milestones of Vocational and Occupational Education and Training* (Vol. Volume 3: Political Perspectives of Vocational and Occupational Education and Training, pp. 163-176). Bielefeld: Bertelsmann-Verlag.
- Baethge, Martin, Solga, Heike, & Wieck, Markus. (2007). Berufsbildung im Umbruch: Signale eines überfälligen Aufbruchs. In F. Dähne & P. Oesterdiekhoff (Eds.). Berlin: Friedrich-Ebert-Stiftung.
- BMBF. (2007). Innovationskreis berufliche Bildung: Mitglieder und Arbeitsverfahren Bonn: BMBF.
- Bundesinstitut für Berufsbildung. (2005). The German Vocational Training Reform Act of 2005: What is new, what is different? . *BWP Special Edition 2005*.
- Bundesinstitut für Berufsbildung. (2010). Credit Systems for Lifelong Learning: Background Report. Bonn: Bundesinstitut für Berufsbildung.
- Bundesinstitut für Berufsbildung. (2011). Vocational Training Regulations and the Process Behind Them.
- Bundesinstitut für Berufsbildung. (2013a). „Datenbank Auszubildende“ auf Basis der Daten der Berufsbildungsstatistik der statistischen Ämter des Bundes und der Länder (Erhebung zum 31. Dezember), Berichtsjahre 2008 bis 2011. Berechnungen des Bundesinstituts für Berufsbildung. . Bonn: Bundesinstitut für Berufsbildung.
- Bundesinstitut für Berufsbildung. (2013b). Datenreport zum Berufsbildungsbericht 2013. Bonn: Bundesinstitut für Berufsbildung.
- Bundesinstitut für Berufsbildung. (2014). Duales Studium in Zahlen. Bonn: Bundesinstitut für Berufsbildung.
- Bundesinstitut für Berufsbildung. (2015). Ausbildung in Deutschland weiterhin investitionsorientiert : Ergebnisse der BIBB-Kosten-Nutzen-Erhebung 2012/13. Bonn: Bundesinstitut für Berufsbildung.
- Burrows, Jennifer, Young, Alexis, Restuccia, Dan, Fuller, Joseph, & Raman, Manjari. (2013). Bridge the Gap: Rebuilding America's Middle Skills. Boston: Harvard Business School.
- Busemeyer, Marius R. (2007). Aufbruch oder Stillstand in der Berufsbildungspolitik? Die neue Allianz für Aus- und Weiterbildung *WISO Direkt* (Vol. Juli 2015). Bonn: Friedrich-Ebert-Stiftung.
- Busemeyer, Marius R., & Trampusch, Christine. (2011). The Comparative Political Economy of Collective Skill Formation. In M. R. Busemeyer & C. Trampusch (Eds.), *The Political Economy of Collective Skill Formation*. New York Oxford University Press
- Carnevale, Anthony P., Jayasundera, Tamara, & Hanson, Andrew R. (2011). Career and Technical Education: Five Ways That Pay Along the Way to the B.A. Washington, DC: Center on Education and the Workforce, Georgetown University.
- Cheng, Andria. (2015, May 1, 2015). Record number of manufacturing jobs returning to America. *Market Watch (Online)*.

- Eisenmenger, Matthias, Pöttsch, Olga, & Sommer, Bettina. (2006). Germany's population by 2050: Results of the 11th coordinated population projection. Bonn: Statistisches Bundesamt.
- European Commission. (2016). Grand Coalition for Digital Jobs. *Digital Economy and Society*. <https://ec.europa.eu/digital-single-market/en/grand-coalition-digital-jobs>
- Federal Ministry of Education and Research. (2013). Recognized Training Occupations. Retrieved July 31, 2013, from <http://www.bmbf.de/en/550.php>
- Firehose Project. (2015). What is a coding bootcamp? Retrieved from <https://http://www.thefirehoseproject.com/definitive-guide/1>
- Graf, Lukas. (2015). Developing Advanced Work-Based Higher Education. Washington, DC: American Institute for Contemporary German Studies.
- Hanks, Angela, & Gurwitz, Ethan. (2016). How States are Expanding Apprenticeship: Center for American Progress.
- Hensen, Kristina Alice, & Hippach-Schneider, Ute. (November, 2012). *VET in Europe: Country Report Germany*. Bonn: Cedefop (European Centre for the Development of Vocational Training). Retrieved from http://www.bibb.de/dokumente/pdf/DE_Country_Report_2012.pdf%C3%9F.
- Hess, Frederick M. (2010). *The Same Thing Over and Over: How School Reformers Get Stuck in Yesterday's Ideas*. Cambridge, Massachusetts: Harvard University Press.
- Hoeckel, Kathrin, & Schwartz, Robert. (2010). Learning for Jobs: Germany *OECD Reviews of Vocational Education and Training*. Paris: OECD.
- Jacob, Marita, & Solga, Heike. (2015). Germany's Vocational Education and Training System in Transformation. Changes in the Participation of Low- and High-Achieving Youth Over Time. *European Sociological Review*, 31(2, Special Issue "Social Change, Cohort Inequalities, and Life Courses in Germany since the 1920's. Contributions from the German Life History Study"), 161-171.
- KMK. (2014). The Education System in the Federal Republic of Germany 2010/2011: A description of the responsibilities, structures and developments in education policy for the exchange of information in Europe. In B. Lomar & T. Eckhardt (Eds.). Bonn, Germany: Secretariat of the Standing Conference of the Ministers of Education and Cultural Affairs.
- Lamprecht, Emil. (2016). The Difference Between UX and UI Design-A Layman's Guide. Retrieved from <http://blog.careerfoundry.com/ui-design/the-difference-between-ux-and-ui-design-a-laymans-guide/>
- Lerman, Robert I., & Rein, Volker. (2015). Building a Robust U.S. Work-Based and Apprenticeship System at Scale: Can Lessons from Europe Help? Washington, DC: American Institute for Contemporary German Studies.
- Malecki, Andrea. (2016). *Schulen auf einen Blick: Ausgabe 2016*. Wiesbaden.
- Nguyen, Mary. (2012). Degreeless in Debt: What Happens to Borrowers Who Drop Out. Washington, DC: Education Sector.
- Nikolai, Rita, & West, Anne. (2013). School Type and Educational Inequalities. In R. Brooks, M. McCormack & K. Bhopal (Eds.), *Contemporary Debates in the Sociology of Education* (pp. 57-75). Basingstoke, UK/New York: Palgrave Macmillan.
- Obama, Barack. (2013). *Remarks by the President in the State of the Union Address*. Washington, DC: Retrieved from <http://www.whitehouse.gov/the-press-office/2013/02/12/remarks-president-state-union-address>.
- OECD. (2014). Education at a Glance: Country Note, Germany. Paris: OECD.
- OECD. (2016). Youth unemployment rate (indicator). doi: 10.1787/c3634df7-en.
- Silverberg, Marsha, Warner, Elizabeth, Fong, Michael, & Goodwin, David. (June, 2004). *National Assessment of Vocational Education: Final Report to Congress*. Washington, DC.
- Symonds, William C., Schwartz, Robert B., & Ferguson, Ronald. (February 2011). Pathways to Prosperity: Meeting the Challenge of Preparing Young Americans for the 21st Century *Pathways to Prosperity Project*: Harvard Graduate School of Education.
- The Economist. (2010). Too narrow, too soon? America's misplaced disdain for vocational education. *The Economist*.

- Thelen, Kathleen Ann. (2004). *How institutions evolve : the political economy of skills in Germany, Britain, the United States, and Japan*.
- Thelen, Kathleen Ann, & Busemeyer, Marius R. . (2011). Institutional Change in German Vocational Training: From Collectivism Toward Segmentalism. In M. R. Busemeyer & C. Trampusch (Eds.), *The Political Economy of Collective Skill Formation*. New York: Oxford University Press.
- U.S. Bureau of Labor Statistics. (2015). Occupational Outlook Handbook, 2016-17 Edition, Software Developers.
- U.S. Department of Commerce. (2015). Spotlight: Commerce Signs Agreement With Germany To Coordinate Workforce Development And Apprenticeship Opportunities *July 2015 Newsletter*. Washington, DC.
- U.S. Department of Education. (2014). Graduation rate from first institution attended for first-time, full-time bachelor's degree-seeking students at 4-year postsecondary institutions, by race/ethnicity, time to completion, sex, control of institution, and acceptance rate: Selected cohort entry years, 1996 through 2007 (Table: 326.10) *Integrated Postsecondary Education Data System (IPEDS)*: Institute of Education Sciences, National Center for Education Statistics.
- U.S. Department of Education, & National Center for Education Statistics. (2014). *Degrees in computer and information sciences conferred by postsecondary institutions, by level of degree and sex of student: 1970-71 through 2012-13*. Washington, DC: Retrieved from https://nces.ed.gov/programs/digest/d14/tables/dt14_325.35.asp.
- Vater, Jan, & Michels, Nicola. (2015). German American Business Outlook. *German American Trade Quarterly*, 26, 14-15.
- Webster, MaryJo. (2014). Where the jobs are: The new blue collar. *USA Today (Online)*.
- White House. (2015). *TechHire Initiative*. Washington, DC: Retrieved from <https://http://www.whitehouse.gov/issues/technology/techhire>.

German chambers in VET

Are chambers really needed in the dual vocational training process abroad?

by Shana Kennedy, Robert Bosch Fellow at DIHK
January 2016

Dual vocational training in Germany

The German dual vocational training model, where an apprentice works for a company while simultaneously going to vocational school, is world renowned, however such a definition forgets important aspects of this *system*. Such a definition misses the fact that dual vocational training is highly standardized, meaning the training for a specific job profile should be quite similar across companies so that the final certificate of completion is recognized nationwide and arguably, internationally. It also leaves out the coordination aspects necessary to bring representatives of employers, employees, national- and state-level governments, and vocational schools together to agree on the skills and knowledge required to meet the needs of the economy.

German dual vocational training requires much more than simply working at a company while going to school part-time: it requires many actors with the German Chambers of Commerce and Industry (Industrie- und Handelskammern: IHKs) playing a key role in establishing and maintaining high-quality and standardized training.

Role of Chambers

In Germany the legal responsibility for the administration, monitoring, and evaluation of vocational education is delegated by the state to Chamber organizations such as the IHKs and the Chambers of Skilled Crafts (HWK) and similar institutions. With the IHKs responsible for 270 of the 330 recognized vocational profiles, we focus here on the IHKs, which play many roles in ensuring the high quality of dual vocational training. Through compulsory membership, the independently-financed IHKs act as representatives of business, whereby it is in their best interest and of the companies they represent to ensure vocational training that meets the needs of employers and the demands of the economy.

Key roles and responsibilities

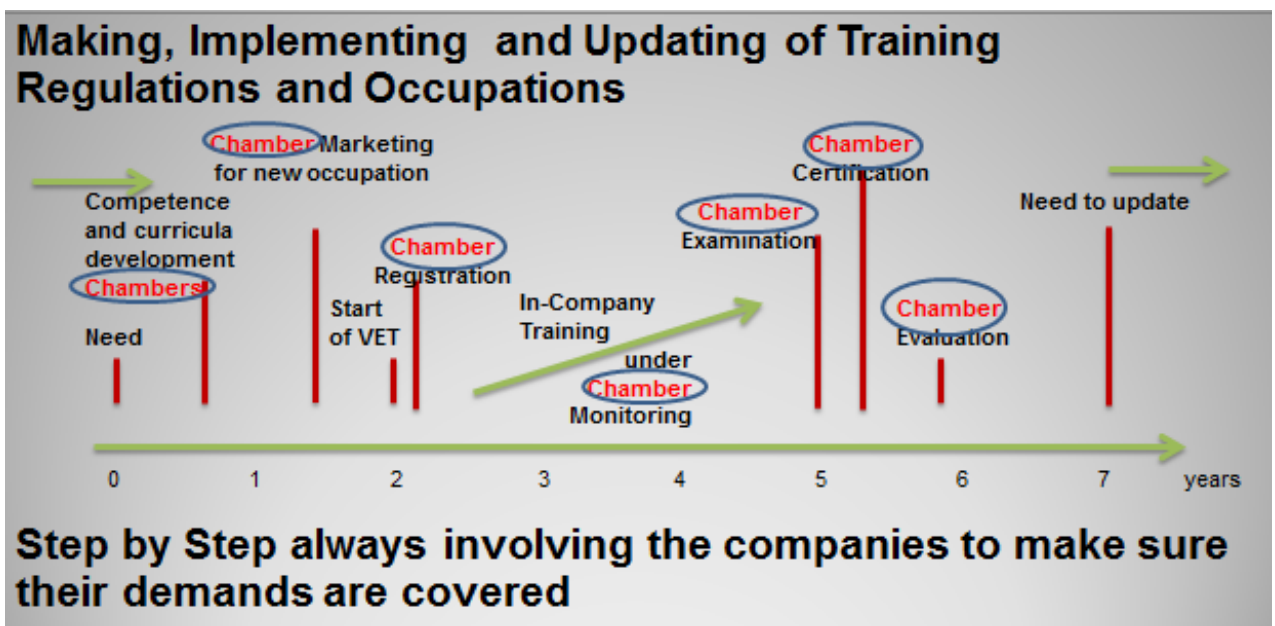
Consultants to Companies: through a continual exchange with the companies, quality requirements are updated, training regulations adjusted, and new training profiles proposed.

Apprentice Services: all training contracts are registered by IHKs to ensure all apprentices have contracts, are being paid, and that companies are fulfilling their commitments according to the law. In the event an apprentice needs additional assistance because of difficulties with the company, the IHK may act as a mediator. They also undertake significant efforts to familiarize potential apprentices of the benefits of dual vocational training.

Assist in Developing Training Regulations and Ordinances: together with representatives of the companies themselves, unions, the National Center for Vocational Education (BIBB), and state-level government, and help of industry and education experts, who have a deep understanding of the skills needed, the IHKs help to develop training regulations for each vocational training profile. For the operational and implementation aspects, the IHKs bring together representatives of employers, unions, and teachers from vocational schools. For vocational profile regulations that are not issued at the federal level and for those that are modified for people with special needs, the IHKs issue the training regulations. IHKs are also heavily involved in the updating of vocational profiles.

Monitor Company-Based Training: the IHKs verify that companies have the qualified trainers and resources to fulfill the training profile requirements so that the apprentices will be sufficiently prepared. If either of these is found to be lacking, the IHKs can make recommendations for ways to improve or to work with other companies and they can also organize training centers for several companies to share. They also provide training and certification for in-company trainers.

Certify Examinations and Issue Certificates: the IHKs organize the examinations for the apprentices by creating examination boards consisting of volunteers with the skills and knowledge relevant to the training profile they are assessing. Exams consist of both theoretical and hands-on components and are usually created at the national level. This ensures that at the end of the specified training and after passing the exam, apprentices have a certificate that is issued by the IHKs and their credentials are recognized throughout Germany.



Chambers: involved in all steps	Reading through the roles and responsibilities of the IHKs in dual vocational training, it is clear: They are one of many actors but they play a key role in maintaining high and consistent standards for company-based training. Without such organizations, multiple firms would have multiple ideas of what training for a specific job looks like. By acting as a platform to bring companies together with the previously mentioned actors to agree on training regulations and implementation and to involve them in examinations, the IHKs help companies develop a common understanding of what training must entail. For both the companies and the apprentice, this means that the certificate that is issued at the end has a concrete meaning and value, which makes it easier for companies to hire workers with the skills they need and easier for employees to transfer between companies if needed.
Benefits of Chambers (IHKs)	Bringing companies together to work on the contents of vocational training also has other benefits. One is a reduced cost to firms that are unable to offer all of the resources needed for the training. Because the IHKs can coordinate and create training centers with the necessary facilities for companies that are unable to, they are able to lower the costs to companies for training and provide more companies with the opportunity to offer training. This is especially important for small and medium-sized enterprises (SMEs) who cannot afford to do train apprentices sufficiently on their own. Also, by working together with the companies the IHKs can facilitate agreements among companies: This is also important to many SMEs who are often concerned about spending time and money on training an apprentice if they are going to be taken by another employer upon completion.
Chamber activities outside of Germany	The IHKs are obviously quite beneficial to the dual vocational training processes in Germany but can they do anything outside of Germany? The German Chambers of Commerce and Industry Worldwide Network (Auslandshandelskammern: AHK) have 130 outposts. As membership organizations, AHKs are the representatives of German Industry and Trade abroad and they offer many areas of services, one of which is helping member companies attain the skilled employees they need. Taking into account local contexts and regulations, AHKs can basically offer much of what the Chambers do in Germany for dual vocational training. Unlike in Germany however, where IHKs are considered to be public bodies for purposes of the administration of vocational training, AHKs are private organizations and depend on the agreement among member companies to fulfill this role.
AHKs in dual vocational training	An AHK acts as a platform to bring employers, vocational schools or education providers, and other institutions together to create German-style dual vocational training. In fact, they are ideal in creating these platforms because of their German Know-How from their many years of experience with this theme in Germany. Furthermore, the AHKs work closely with the IHKs in Germany, who are responsible for the administration, monitoring, and examining of dual vocational training, which provides even more Know-How. Lastly, because AHKs are membership organizations and many of their members are German companies, there are often a high percentage of companies who have had plenty of experience with the dual vocational training system.

Can AHKs do what the IHKs do abroad?

Chamber (IHK) Activities in Germany

Possible AHK Activities Abroad

Consultants to Companies

Yes, and in this capacity, they can also advise companies on the basics of starting dual vocational program

Register and Advise Apprentices

Yes, the AHKs register apprentices participating in dual training programs into their data system and can meet and advise potential apprentices to discuss the benefits of dual vocational training.

Issue Regulations and Ordinances

Kind of, as nongovernmental organizations abroad, they cannot issue regulations and ordinances, but in working with companies and local institutions in the context of the home country's education system, they can develop training learning goals, standards and the accompanying curricula. In this role the AHKs can also work with vocational schools to ensure the accompanying school-based curriculum is applicable.

Monitor Implementation of Training, Review Facilities, Instructors, Apprentices

Yes, among member companies active in dual vocational training programs, AHKs work with member companies to ensure there is a training plan in place to meet the training goals and standards (see above), that the required facilities and personnel are available at the company and when not to help develop a solution, and that the quality standards agreed upon are maintained. They also provide training for the in-company trainers to ensure they are prepared to work with apprentices.

Certify Examinations

Yes, working with companies, vocational schools, and experts, the AHKs develop examination boards, which assess both theoretical and practical knowledge and skills. After successful completion the required training and passing the exams, participants receive a certificate. AHKs offer their own certificates and even more exciting, many also offer an AHK-DIHK Certificate (local AHK and the Association of German Chamber of Commerce and Industry) which are aligned to the standards and processes of the German model. The AHKs may also work with the government institutions of the country for state recognition of the certificate.

Conclusion

All of the above steps do not happen by chance in dual vocational training, they require the knowledge, expertise, and experience the AHKs offer, making them the perfect "go-to" partner for those wanting to begin or improve dual vocational training models outside of Germany.

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