Nordic Journal of Vocational Education and Training, 2024

Evaluating labour market–educational programme fit: A case study on aligning supply and demand for competences using a generic approach

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Abstract

There is a long-standing debate within academia and practice on how specific educational programmes and educational systems, in general, prepare students for the labour market after graduation. This article contributes to this debate by exploring to what extend Bloom's revised taxonomy (BRT) can be used to investigate the degree of alignment between the demand of the Danish labour market and the supply of competences. We present a generic method for evaluating labour market–educational programme fit that can be used across educational programmes. This method is developed and tested in a case study in which BRT is used to investigate the alignment between the curriculum and labour market demand for skills, knowledge, and competences. We compare the curriculum of the multimedia design programme with relevant job advertisements. This comparison involves a qualitative analysis of both the programme's learning goals and the advertisements' content based on qualitative and abductive coding. We identify areas of misalignment and discuss how the educational programme can use the information to align the supply with the demand for competences.

Keywords: curriculum development, employability, graduates, Bloom, job ad analytics

NJVET, Vol. 14, No. 4, 1–23 https://doi.org/10.3384/njvet.2242-458X.241441

Peer-reviewed article
Hosted by Linköping University Electronic Press

Introduction

In recent years, the public debate over graduate skills and employability has increased (Collet et al., 2015; Griffin et al., 2012; Olo et al., 2021). The labour market is rapidly changing due to technological, economic, and societal trends, and educational systems try to balance subject-specific knowledge and institutional norms (Hopmann et al., 1995), while providing students with the skills, knowledge, and competences in demand in the labour market. This is a moving target because there is no guarantee that the competences and skills needed today will also be in demand tomorrow (Barnett, 2012; Giridharan, 2020; Kress, 2000). In a competitive, globalised (Song et al., 2022) and knowledge-based economy (Collet et al., 2015), a pressing question thus is how educational systems prepare students for the labour market.

Educational programme curricula are the educational systems' means of navigating the intersection between the rapidly changing labour market and an unknown future (Hopmann et al., 1995). Curricula often specify expected learning outcomes based on learning taxonomies (Irvine, 2021). These taxonomies communicate the knowledge, skills, and competences that students acquire through educational programmes and are often used to define learning objectives without a direct link to the labour market, including the employability of students after graduation.

Considering the widespread use of learning taxonomies and the challenge of preparing students for an unknown future, we address the following research question: *To what extent can Bloom's revised taxonomy be used to investigate the degree of alignment between labour market demand and educational programmes' supply of competences?* Our point of departure is an investigation of the multimedia design programme at Business Academy Aarhus (BAAA). We perform a qualitative analysis of national and regional curricula, as well as a representative sample of 300 job advertisements from 2018–2021 in which 'multimedia designer' appears in the job text. Subsequently, we evaluate the labour market–educational programme fit in terms of supply and demand for skills, knowledge, and competences based on our targeted search for relevant job advertisements.

As part of the study, we have developed and used an analytical framework based on Bloom's revised taxonomy (BRT) (Anderson et al., 2001). This framework is used in combination with Jobtrend, a job ad analytics tool and database developed at BAAA. Together, they constitute a generic approach to evaluating labour market–educational programme fit. The study has both research and practical implications. We show and discuss the value in using BRT (Anderson et al., 2001) in assessing the quality of educational programmes in light of labour market demand and needs. We also provide a generic approach that heads of studies, policymakers, and other stakeholders may use to help

ensure alignment between what students are taught and their subsequent employability.

Taxonomies of learning

In educational development, different learning taxonomies or classifications are widely used. The common denominator is that these taxonomies describe different levels or stages of learning and knowledge (Irvine, 2021). Different taxonomies are often used to construct learning goals or descriptions of learning behaviour. Therefore, taxonomies 'provide a useful tool in distinguishing the appropriateness of particular learning outcomes for particular module levels' (O'Neill & Murphy, 2010, p. 2). Taxonomies can, for example, be used within a course or across an educational programme and, therefore, may have varying impacts on teaching and learning (Irvine, 2021).

The earliest taxonomy is that of Bloom et al. (1956). This taxonomy distinguishes three domains relevant to educational outcomes (Ferris & Aziz, 2005): cognitive, affective, and psychomotor skills. It has served as inspiration and been adapted by several subsequent taxonomies, including, but not limited to, Ferris and Aziz (2005), Krathwohl (2002), and Anderson and Krathwohl et al. (2001). Other widely used taxonomies include Collis and Biggs' SOLO-taxonomy (structure of observed learning outcome) (Biggs & Collis, 1982, 1989) and Fink's taxonomy (2003, 2013).

This study draws on BRT (Anderson & Krathwohl, 2001, p. 70). Just like the original taxonomy (Bloom et al., 1956), BRT contains six categories of learning objectives within the cognitive domain. The six categories represent a hierarchical structure of the domain, ordered from 'simple to complex and from concrete to abstract' (Krathwohl, 2002, p. 212). The underlying premise is that students must master the first category, or level, to advance to the next one. However, unlike the original taxonomy, BRT allows the categories to overlap (Krathwohl, 2002). Whereas the original taxonomy uses nouns and passive verbs, the revised taxonomy uses active verbs, in recognition of students as active learners. BRT is commonly used to identify learning goals, such as knowledge, skills and competences, evaluate course and curriculum design, and identify creative thinking (Irvine, 2021, p. 19).

Employability and curricular development

The link between taxonomies and the ability of educational systems to prepare students for the labour market is captured by the concept of employability. There are multiple definitions of what employability means (Boahin et al., 2014; Hillage et al., 1998; Olo et al., 2021; Williams et al., 2016), and whether it should be seen as a positive means to build human capital and improve individuals' opportunities in the labour market or as a direct threat to academic learning,

pedagogies, and curricula (Jackson, 2014; Olo et al., 2021, p. 91; Wheelahan & Moodie, 2021). In this article, we understand employability as the ability of graduates to obtain and maintain a job based on their knowledge, skills, personal abilities, and beliefs (Hillage et al., 1998; Knight & Yorke, 2002; Olo et al., 2021). From this perspective, employability is not a threat to academic learning, but a natural extension of it. In educational systems and the development of curricula, graduate skills are a vital component of employability. Based on the articles mentioned above, this article defines graduate skills as the generic and subject-specific skills that graduates should gain and develop during their education. It also sets graduate skills apart from employability skills. Graduate skills are *directly related* to the discipline and the educational system, while employability skills are developed and maintained both *within and outside* the educational system. Employability and graduate skills encompass both subject-specific and generic skills. Subject-specific skills are those that are technical and academic related to a particular discipline, while generic skills are broader and more transferable, applicable across different roles and contexts (Bridgstock, 2009).

One place where these skills and competences are explicitly formulated is in job advertisements. According to Rios et al. (2020) job advertisements typically require that employers articulate in their own words the specific skills and competences that employees must have. Due to word limitations on job advertisements, they may be unable to list all the required skills and are more likely to highlight the desirable skills that are uncommon among applicants. Job advertisements also offer information about the general needs of the labour market for so-called 21st century skills across various jobs and sectors (Rios et al., 2020). It's crucial to keep in mind that job advertisements only offer a limited perspective of reality. They don't provide data on the actual skills or competences possessed by successful candidates or demonstrate the real skills or competences required for a job (Harper, 2012).

However, several studies have shown that it is difficult to establish a clear link between graduate skills, curriculum design, and labour market demand (Holmes, 2001; Mahajan et al., 2022; for a review, see Olo et al., 2021). These studies suggest a discrepancy or misalignment between what is taught in higher education and what the labour market needs. Some authors argue that a discrepancy between education supply and labour market demand has negative implications for graduates' general job satisfaction and the firms in which they are employed (Lee & Sabharwal, 2016; Rhorbach-Schmidt & Tiemann, 2016). Other studies focus on the link between employability and learning taxonomies, specifically Bloom's taxonomy and BRT. Examples include studies of teaching and learning formats (Stoyanova & Yovkov, 2016), educational programmes (Kulkarni et al., 2017; Thurner & Böttcher, 2020), and employability as an integrated part of curricula with regard to an extracurricular activity (Daubney,

2021). In the present study, we foreground learning taxonomies to identify potential discrepancies between the educational curriculum and the demand for competences in the labour market. However, it is important to remember, that learning taxonomies and the educational system does not bear the sole responsibility for graduate employability – nor does the students for their employability skills. As Jackson (2014) writes; 'disciplinary knowledge, macro-economic and labour market conditions […], learning transfer […] and job mobility […] each influence employability´(p. 238).

When considering the vocational curriculum, it becomes evident that there is a persistent tension between the subject-specific and general competences that students need to develop throughout their education. This tension results in a constant need to balance, on the one hand, the subject-specific knowledge, skills, and competences required for a specific profession and, on the other hand, the general competences needed across contexts, roles, and society in general (Kriese et al., 2022).

In addition, a certain degree of misalignment is inevitable when curricula must navigate between current and future demands, cultural reproduction and transmission of tradition (Hopmann et al., 1995), just as a critical stance to external factors and influences on curriculum development is important (Krause, 2022). However, in this study, we argue that learning goals can be used to evaluate labour market–educational programme fit with the aim of reducing misalignment.

Finally, it is important to remember that the focus in further education should not only be on preparing students for the workforce. It also plays a critical role in promoting social mobility and civic engagement. The curriculum should aim to develop well-rounded individuals capable of critical thinking and making meaningful contributions to society (Joseph Jeyaraj & Wald, 2020). Striking a balance is key, as the curriculum should aim to develop both job-relevant skills and a broader social awareness. However, for the purposes of this article, the focus will primarily be on the connection between the curriculum and the labour market, particularly through job advertisements.

Research design and methodology

To investigate the degree of alignment between labour market demand and educational programmes' supply of competences, we consider job advertisements and learning goals to be proxies for this demand and supply. Therefore, we analyse a representative sample of specific job advertisement and the curriculum (in which the learning goals are specified) of an educational programme using BRT. Labour market demand is identified using Jobtrend (Mathiasen, 2022), a job advertisements analytical tool and database. Our

investigation is a case study of a multimedia design programme, but we present a generic approach to evaluating labour market–educational programme fit that relies on job analytics. Thus, our generic approach is applicable to any educational programme that expresses learning objectives.

Using the Jobtrend tool

Jobtrend (Mathiasen, 2022) is used to harvest and analyse job advertisements in Denmark. The tool relies on web scraping to collect and store job advertisements from two major job websites, Jobindex (2022) and Careerjet (2022). Jobtrend provides job ad analytics for efficient and reliable insights into trends in job market competency demands. BAAA utilises Jobtrend as one of several methods to design new degree programmes and to redesign existing ones. Thus, Jobtrend provides data-driven insights that point to content elements of curricula that are relevant and irrelevant in preparing students for the job market. Besides the possibility of creating custom searches within the job data, Jobtrend identifies and monitors 19,604 predefined and standardised competences found in job advertisements, which have been identified and validated by the classification of 'European Skills, Competences, Qualifications and Occupations' (ESCO) project (European Commission, 2022). In addition, Jobtrend enables analyses of vocational competences across the curricula of BAAA programmes. The tool queries the job advertisements database based on user-specified search criteria, for example, to find advertisements that correspond to specific search criteria. The identified job advertisements can then be subjected to statistical as well as qualitative analyses to gauge trends in demand. Its database contains all job advertisements since 2018, and trends in labour market demand can therefore be analysed. At the time of writing, the database had indexed 51,063,425 competences in 2,199,260 job advertisements.

Case description – BAAA and multimedia design

Our case study revolves around the multimedia design educational programme at BAAA, a Danish school of applied sciences. According to the international standard classification of education (ISCED), BAAA's educational programmes can be classified as academic profession (AP) degree programmes at level 5 and bachelor of science (BSc) programmes at level 6. At these levels, BAAA provides a wide range of undergraduate programmes which are vocational and primarily target the private sector. The heads of studies work closely with representatives from hiring companies to align curricula to labour market needs. The duration of all programmes varies depending on the degree level, ranging from two to three and a half years.

Multimedia design is an academy profession, or what UNESCO calls a short-cycle tertiary education, which is defined as an education 'designed to provide

participants with professional knowledge, skills and competences. Typically, they are practically based, occupationally-specific and prepare students to enter the labour market' (*International Standard Classification of Education*, 2012, p. 48). It is a 2-year programme that provides knowledge and skills in user interface design (UI), user experience design (UX), digital content, programming, and business understanding. It is a project-oriented programme with a strong focus on group work. The first three semesters include a variety of subjects with a focus on project work. This is followed by an internship where students learn to apply their skills and competences in practical settings. Through the programme, students build a portfolio of work showcasing their creative skills in multimedia design, as well as documenting their intercultural competences, knowledge, and experience. Graduates typically work with web solutions and mobile services design and development, utilising their competences in digital media, innovation, and idea development. Overall, the programme is explicitly oriented towards the labour market, through its practice orientation.

In 2019, a total of 911 students graduated from the multimedia design program. According to a 2022 joint report by the Ministry of Education and Statistics Denmark, 12–21 months after graduation, the average unemployment rate for these graduates was 16.9 %. In comparison, graduates from all other Danish AP degree programmes had an average unemployment rate of 12.5 % during the same period. This means that the multimedia design programme had approximately 35 % more graduates who were unemployed compared to similar programmes.

During our investigation, BAAA employed Jobtrend to identify relevant and irrelevant components of curricula to better prepare students for the job market. This, combined with the high unemployment rate after graduation, makes it a relevant object of study.

Data analysis

Our study employs a qualitative method of data analysis, which involves coding and categorising competences by two of the authors. After collecting curriculum-related documents and job advertisements, the data were coded in Nvivo using BRT as a framework to categorise the educational programme's supply and labour market demand for competences. The reliability of our coding (O'Connor & Joffe, 2020) was assessed by randomly selecting and coding 35 job advertisements (of the 300 advertisements analysed), leading to discussions and code revisions. After the revisions, the assessment of intercoder reliability resulted in a Kappa statistic of $\kappa = 0.75$, which indicates an acceptable level of agreement among coders (McHugh, 2012). Having verified the intercoder reliability, the remaining 265 job advertisements were coded by one of the authors.

As a starting point, the six hierarchical categories in BRT were used to identify and categorise the supply and demand for competences. Each competence was coded as belonging to one of the taxonomical levels. We identified action verbs that were instrumental in the coding process. Table 1 provides an overview of the BRT definitions, the actions verbs, and examples from the job ads.

Table 1. Taxonomic categories (BRT), action verbs used for coding, and examples of coded text (adapted from Anderson & Krathwohl, 2001).

Category	BRT definition	Action verbs	Job ad example
1. Remember	Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers	Define Label List	
2. Understand	Demonstrate understanding of facts and ideas by organising, comparing, translating, interpreting, giving descriptions, and stating main ideas	Understand Know Comprehend	'Knowledge and understanding of programming (HTML 5)'
3. Apply	Solve problems to new situations by applying acquired knowledge, facts, techniques, and rules in a different way	Prepare Apply Produce	'Produce graphic design and pictures for printed media'
4. Analyse	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalisations	Analyse Compile Examine	'Analyse data'
5. Evaluate	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria	Advise Evaluate Optimise	'Evaluate social media campaigns and ads'
6. Create	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions	Develop Create Produce (indepen-dently)	'Create visual universes and identities'

Because BRT categories have been criticised for not leaving room for subject-specific skills and knowledge, we relied on an abductive coding approach to discover and code competences outside the scope of the taxonomy. The abductive coding considers that BRT is developed in an educational context, and its use, therefore, needs to be adapted to the job advertisements context. Thus,

this abductive coding process revealed the need for an additional seven categories of codes to allow for more fine-grained data coding. Subsequent analysis of the required competences revealed that only 47.7 % of the total number of coded statements (n = 2,435) were based on BRT, while 52.3 % fall into these additional categories. For instance, work experience and character traits are demanded but not explicitly supplied when analysing the educational programme. The additional coding categories are:

- Professional qualities, for example, how you approach tasks and how you make use of competences in your work.
- Character traits, for example, personal traits that identify who you are as a person.
- Experience, for example, previous experience and know-how.
- Lifelong learning, for example, an ad that underscores the need for further competence development through education.
- Technical competences, for example, using a specific piece of software, method, etc.

This coding provided overall insights into the taxonomical misalignment of supply and demand of competences in terms of the six BRT categories, for example, remember, understand etc. However, it did not yield insights into any potential misalignment in terms of specific work tasks, for example, graphic design, data analysis etc. for each of the six BRT categories. To adequately investigate the degree of taxonomical misalignment in terms of specific work tasks, a second round of coding was conducted. These two coding processes constitute a framework for investigating misalignment at two levels. All coded BRT competences were categorised based on the theme of the work task, for example, social media (SoMe), programming etc. Therefore, after the first round of taxonomical coding of competences, these competences where then coded a second time based on the theme of the work task, for example, graphic design, SoMe, programming etc. In doing so, we were able to identify not only misalignments at an overall taxonomical level, but at a work task level, for example, whether programming was supplied at a low taxonomical level but demanded at a high taxonomical level. The curriculum competences were divided into 10 categories that capture different work tasks on the labour market, and analysis of the job advertisements yielded an additional 13 categories of work tasks (visualised in Figure 2). In the following, the supply and demand for competences will first be examined separately.

Results

Curriculum

Without the additional coding categories, BRT captures 91.5 % of the total 141 competences identified in the curriculum. The remaining competences in the programme was coded into the category of character traits. Thus, the analysis reveals that BRT provides an optimal framework for categorising curricula.
When looking at the distribution of competences across BRT categories on the supply-side, the data shows an uneven distribution. Approximately two-thirds of the competences fall into categories at the three lowest taxonomic levels, whereas the three highest levels only account for 31.8 % of the supplied competences. In fact, the 'analyse' and 'create' categories only account for 1.6 % and 6.2 % of the 129 identified BRT competences, respectively. Besides 'analyse' and 'create', however, the distribution is more even. The distribution is visualised in Table 2.

Table 2. Descriptive statistics of coded competences in curricula.

Code names	**Total # of competences**	**% of curriculum containing competence**	**Distribution of % for each set of codes**	**% of total competences**
BRT codes	129	100	100	91.5
1. Remember	30	100	23.3	21.3
2. Understand	30	100	23.3	21.3
3. Apply	28	100	21.7	19.9
4. Analyse	2	50	1.6	1.4
5. Evaluate	31	100	24.0	22.0
6. Create	8	100	6.2	5.7
Additional codes	12	100	100	8.5
Professional qualities	0	0	0	0
Character traits	12	100	100	8.5
Experience	0	0	0	0
Lifelong learning	0	0	0	0
Technical competences	0	0	0	0

Job advertisements

Without the additional coding categories, BRT captures only 47.7 % of the total 2,435 competences identified in the 300 randomly selected job advertisements. The remaining 52.3 % of the competences were categorised as one of the five additional codes. This result underlines the need for additional coding when using the BRT framework on job advertisements, as it proves a suboptimal fit for categorising demanded competences job advertisements. Like the results of the supply-side, when looking at the distribution of competences across BRT categories on the demand-side, the data shows an uneven distribution. 83.2 % of the total 1,162 BRT competences fall into the three lowest levels, while the three highest levels account for 16.8 % percent of BRT competences. More specifically, the 'apply' level accounts for most BRT competences by 74.8 %, while the lowest level 'remember' accounts for 0 %. The distribution is visualised in Table 3.

Table III. Descriptive statistics of coded competences in job advertisements.

Code names	**Total # of competence**	**% of ads containing competence**	**Distribution of % for each set of codes**	**% of total competences**
BRT codes	1162	75.7	100	47.7
1. Remember	0	0	0	0
2. Understand	98	24.7	8.4	4.0
3. Apply	869	72.7	74.8	35.7
4. Analyse	39	9.0	3.4	1.6
5. Evaluate	85	19.7	7.3	3.5
6. Create	71	15.0	6.1	2.9
Additional codes	1273	98.7	100	52.3
Professional qualities	356	56.7	22.5	14.6
Character traits	346	52.7	21.8	14.2
Experience	302	50.3	19.1	12.4
Lifelong learning	13	4.3	0.8	0.5
Technical competences	256	53.3	16.2	10.5

Comparative analysis

A comparative analysis is needed to evaluate the degree of alignment between the educational programme's supply and labour market demand for competences. Overall, BRT is better at capturing the supply of competences from the educational programme compared to the demand of the labour market. 91.5 % of the total coded competences in the educational programme are captured by BRT, while 47.7 % of the total coded competences in the job advertisements are captured by the framework. The distribution of competences across the BRT levels for the supply and demand of competences (Tables 2 and 3) is visualised in Figure 1. The competences demanded are very application-oriented ('apply'), whereas the supply is more evenly distributed between levels. The demand for textbook knowledge ('remember') is also noticeably absent for demanded competences, although it constitutes a significant part (23.3 %) of the competence supply of the educational programme. However, the comparative analysis indicates that there is alignment at the higher taxonomic levels of 'analyse' and 'create'. However, all though there seems to be alignment between these levels for the supply and demand of competences, they constitute a small percentage of the total supplied and demanded competences.

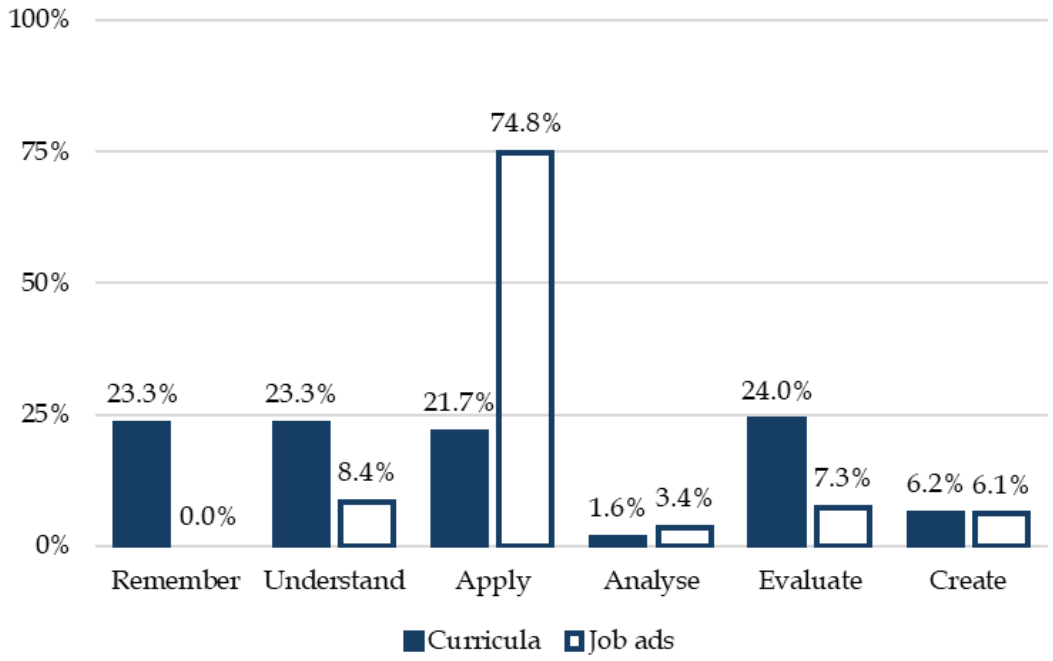

Figure 1. Supplied and demanded BRT competences in percentage of each dataset.

As part of the comparative analysis of the degree of alignment, the supplied and demanded competences were coded into categories of work tasks, which made

it possible to identify not only misalignments at an overall taxonomical level, but at a work task level for example whether programming was supplied at a low taxonomical level but demanded at a high taxonomical level. The misalignment between labour market demand and the educational programme's supply of competences as they relate to work tasks is visualised in Figure 2. Overall, the figure reveals several work tasks that are not mentioned in the educational programme but are demanded by the labour market, and vice versa. Alignment between supply and demand were identified for 4 of 22 work task, while the remaining 18 work task themes were either only demanded or supplied. The degree of alignment between the educational programme and the labour market with respect to work tasks is visualised in Figure 2. It illustrates a high degree of misalignment.

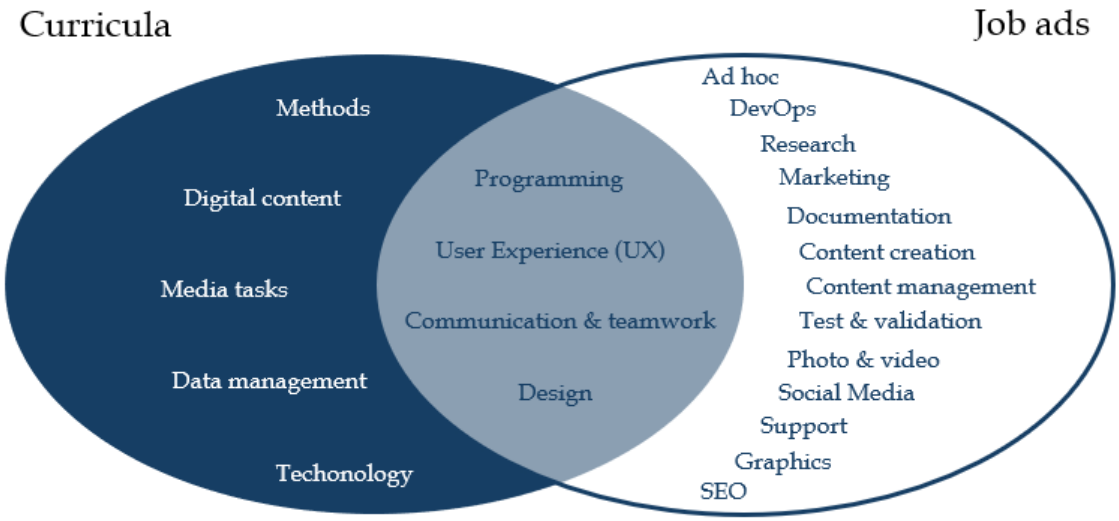

Figure 2. (Mis-)alignment of multimedia design work task themes supplied and demanded. A fifth aligned work task called 'various tasks' is not included in the model, as it included a wide range of atypical tasks.

Figure 2 shows a high degree of misalignment regarding work task themes. Nevertheless, it might be the case that there is alignment across the taxonomical levels for each of the aligned work tasks. However, when looking across the distribution of BRT levels within each of the four aligned work themes, the general misalignment in the distribution across BRT levels for supplied and demanded competences is evident. The demanded competences are more application-oriented while the supply of competences is focused on the three

lowest levels. We exemplify this in Figure 3 by showing the distribution of competences between BRT categories for the work task 'design'.

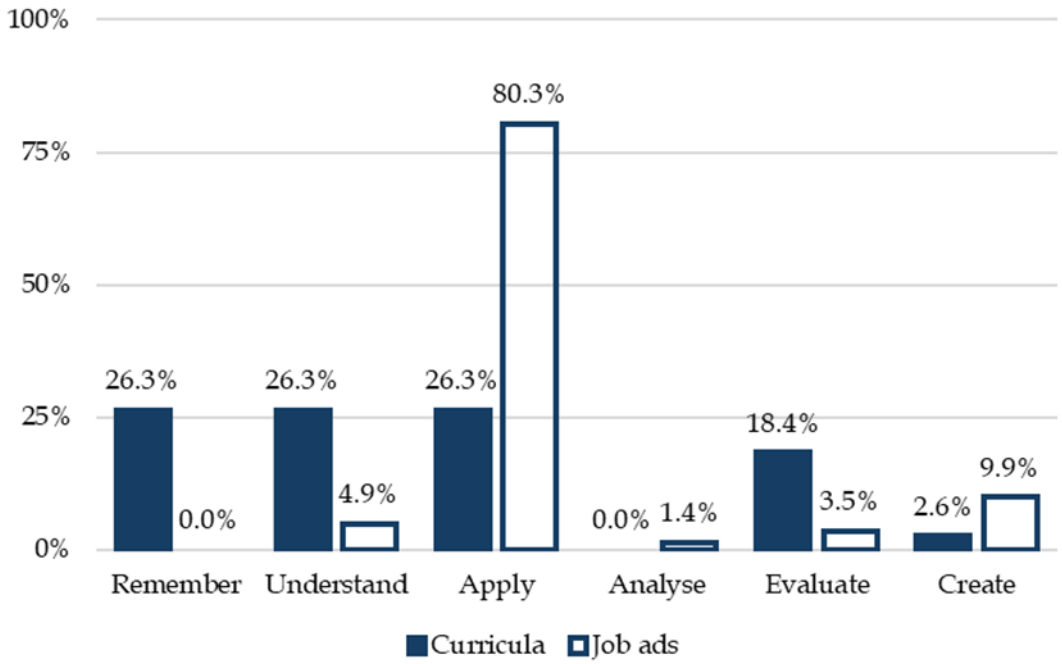

Figure 3. Distribution of competences across BRT categories for the 'Design' work task.

Discussion

Based on our analysis, we see a misalignment in terms of the supply and demand for lower-vis-à-higher-level competences. In the curriculum, almost 50 % of the learning objectives are formulated as competences at the level of 'remember' or 'understand', the two lowest taxonomic levels. Learning goals at the lower taxonomic levels are, however, essential for further competence development and the ability to solve more complex tasks (Anderson & Krathwohl, 2001). Nevertheless, our analysis shows that the labour market does not necessarily value candidates with textbook knowledge or that they are able to establish connections 'between the 'new' knowledge to be gained and their prior knowledge' (Anderson & Krathwohl, 2001, p. 70) as the 'apply' level accounted for almost three thirds of the demanded BRT competences while 'remember' accounted for 0 %. Additionally, the labour market demands competences at higher taxonomical levels as exemplified in Figure 1. Candidates should be able to apply their knowledge to create value for the hiring company. This is potentially problematic for the employability of graduates if the curriculum emphasises 'remember' and 'understand' learning goals when they are required

to have 'apply' and 'create' competences. If the job ad competences, however, demanded lower taxonomical levels, this would not have been problematic as lower taxonomical levels are a prerequisite to the higher. This mismatch between competence supply and labour market demand can potentially have negative implications for graduates' job satisfaction and their sense of being under- or overqualified, as argued by Lee and Sabharwal (2016) and Rohrbach-Schmidt and Tiemann (2016).

In general, the results indicate that, although one of the overall goals of the educational programme is to provide graduates with the competences demanded by the labour market, there is a misalignment between supply and demand. While some of the acquired competences are demanded by the labour market, others are not and vice versa. This finding supports extant research of mismatches between what is taught in higher education and labour market demand (Olo et al., 2021). The comparative analysis reveals that competences related to, for example, the work task themes 'SoMe' and 'marketing' are required of multimedia designers, while 'digital content' and 'media assignments' are not, although they are taught it in the educational programme. Additionally, the analysis reveals that there is misalignment between the taxonomic levels of competences supplied and demanded for specific work tasks.

In the following, we present our method as a generic approach to evaluating labour market–educational programme fit that others can use to determine the degree of alignment between an educational programme's supply and labour market demand for competences. The method can be seen as an attempt to bridge the gap between what is supplied and what is in demand, as well as a method, that can be used to engage in critical dialogue between institutions and labour market, as well as between institutions, faculty and students in order to 'identify curriculum principles and anchor points to guide decision-making and deliberations about how to evaluate and prioritise responses to these external factors and influences.' (Krause, 2022, p. 48).

Prior to the four-step process, it is important that curriculum-related material (such as course descriptions, syllabi, course- and programme regulations) is selected and collected.

1. **Targeted search for relevant job advertisements.** The first step is to search for job advertisements targeting graduates of the particular educational programme. Using a job ad analytics tool like Jobtrend makes large-scale searches for representative samples of advertisements manageable. Since job advertisements may be relevant to graduates of more than one programme and because graduates may apply for atypical jobs, a targeted search for advertisements requires in-depth knowledge of the programme, as well as insights into the link between curriculum, competences, and employability.

2. **Choose a taxonomy of learning.** The second step is to choose a taxonomy as an analytical framework. The choice of framework influences the ability to identify, understand, and address questions and problems of misalignment between labour market demand for and educational programmes' supply of competences. Using a taxonomy makes it possible to highlight 'the breadth, or lack of breadth, of the objectives and items' (Krathwohl, 2002, p. 213). BRT or another taxonomy may be useful depending on the context and analytical purposes.
3. **Abductive coding and thematic categorisation.** The third step is to code and categorise the data. A qualitative and abductive analysis allows for a flexible and inclusive coding process, which helps ensure that all competences (in both the curriculum and job advertisements) are coded. Such an approach supports a holistic and nuanced analysis of the alignment between supply and demand for skills, knowledge, and competences. Check coding helps to strengthen the reliability of the data coding. When all competences are coded, a subsequent coding is carried out to analyse work theme misalignment.
4. **Evaluate the degree of alignment.** The fourth step is to analyse the degree of alignment in general and in relation to specific work task themes to generate insights into possible changes to curriculum design by identifying unmet labour market needs. By comparing themes of competences across the curriculum and job advertisements and how they are distributed in terms of taxonomic levels, it is possible to discern similarities and differences and determine the degree of alignment. As argued earlier, iIt is worth mentioning that 100 % alignment is neither desirable nor possible as the curriculum and job advertisements differ in nature. The curriculum is written, among other things, to guide lecturers in selecting relevant educational content, and job advertisements are written to attract candidates for vacant positions. However, a higher degree of alignment can positively affect the employability of the candidates.

Following this four-step process provides valuable input to quality assurance and educational development processes. It is arguably time-consuming, and automation through machine learning would therefore be an important next step. Text mining by means of, for example, natural language processing (NLP) is one possible avenue and the subject of future research. Automation would support an ongoing assessment of the alignment and needed adaptations to educational programmes in response to changing trends and labour market demand.

Although we developed the method based on a single case study, we consider it relevant to use in other educational programmes and job market sectors

because it relies on a generic approach that is not tied to the multimedia design programme. Additionally, the approach can be used with a variety of taxonomies as a basis for alignment analyses. This would require, that the learning objectives are identified based on the framework of the chosen taxonomy.

There are limitations to both the suggested four-step approach and our use of BRT in this study. The taxonomy is developed as an educational instrument, which makes it particularly useful when creating and comparing learning goals, assessment criteria, etc., but it is not equally applicable outside educational systems. First, the language used in, for example, curricula and job advertisements differs significantly. Educational programmes often specify learning goals based on a taxonomy, while labour market demand, as expressed in job advertisements, is expressed as competences written in a language that is not limited by the nomenclature of a taxonomy. Language differences make comparisons more challenging and time-consuming, hence the need for NLP. Second, the work task themes and competences identified in the two data sets are quantitatively and qualitatively different. Our analysis reveals that the demand for work task and competences exceed the supply, and the work task themes found in the curriculum are broader and less specific compared to those in the job advertisements. This difference affects coding and categorisation. Third, our analysis reveals that labour market demand for competences, which is not relatable to BRT, account for 57.7 % of all competences. Among these, professional and personal competences are the most sought-after, followed by experience and technical competences. This calls for further investigation of how to capture and incorporate competences beyond BRT and similar taxonomies to achieve a more nuanced and precise picture of the degree of alignment. However, we were able to evaluate the labour market–educational programme fit in this particular case study by using BRT.

The use of job advertisements can shed light on one aspect of the discrepancy between curricula and the labour market. However, this approach focuses primarily on measurable criteria of the labour market–educational programme fit. Future studies should explore this fit using more qualitative research methods, such as conducting interviews with key stakeholders, for example educators, students, and employers. This will help provide context to the data-driven insights provided by data analytics tools like Jobtrend and add nuance to our understanding of misalignments.

Despite these challenges and limitations, we argue that the suggested four-step approach has several strengths. Most importantly, it enables a value-creating evaluation of the alignment between labour market demand and the supply of competences by educational programmes. However, the coding process must consider, for example, personal and professional competences that are not covered by the analytical framework used. These should be considered as part of

educational development and quality assurance processes in dialogue with teachers, educational leaders, and other stakeholders. Consequently, this study shows that a taxonomy like BRT is insufficient as an analytical framework when formulating or revising learning goals when considering the needs of hiring companies. To ensure employability and help graduates enter the labour market, there needs to be an increased focus on competences and skills beyond those described by learning taxonomies, such as personal and professional competences. Initially, our four-step method can be used to illustrate and hopefully develop a shared language between the curricula aspects of specific competences and labour market demand, including a focus the competences developed through educational programmes, thus helping the graduate – and the institutions – by bridging the potential gap between graduate skills, curriculum design, and labour market demands (Holmes, 2001; Mahajan et al., 2022; Olo et al., 2021). Finally, our four-step process is a much more data-driven and evidence-based approach that will necessitate changes to organisational routines and processes when developing educations, instead of, or in addition to, using experts and company representatives as critical information sources when changing educational content.

Conclusion

Through a case study, we explore to what extent BRT can be used to investigate the degree of alignment between labour market demand and the supply of competences from an educational programme. We examine empirically the alignment between the supply of competences of a multimedia design programme and the corresponding labour market demand, as evidenced by job advertisements. We rely on a job ad analytics tool to extract and analyse a sample of 300 representative advertisements through qualitative, abductive coding. The result is compared to an analysis of the educational programme's curriculum. Although the results are linked to a specific case, we argue that our method can be used by others as a generic approach when developing and revising curricula while considering labour market-educational programme fit. We suggest a four-step process that can be adapted to other educational programmes and contexts. By following our approach, we argue that it is possible to transition from 'curriculum' and 'labour market demand' to 'curriculum in demand'. Our approach can be used to identify competences that are needed but not taught and competences taught but not needed. It requires, however, new work practices around curriculum development and revision.

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