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Taran Thune Liv Anne Støren

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Study and labour market effects of graduate students' interaction with work organisations during education

A cohort study

Taran Thune

Centre for Technology, Innovation and Culture, University of Oslo, Oslo, Norway, and

Liv Anne Støren

NIFU Nordic Institute for Studies in Innovation, Research and Education, Oslo, Norway

Abstract

Purpose – The purpose of this paper is to present an empirically based discussion of how cooperation between higher education institutions and work organisations (WOs) can increase graduate learning experiences and employability.

Design/methodology/approach – Data are based on an electronic and mail-based graduate survey among Norwegian master's degree graduates six months after graduation. 2,232 master degree graduates responded to the survey, giving a 54 per cent response rate. All subject fields were represented.

Findings – 77 per cent of the graduates have some forms of interactions with WO during their studies. The level and mode of participation differ, however, very much, and the benefits of participating differ by mode of interaction. Project-based interaction is positively and significantly associated with completing studies on time. Further, graduates who have participated in either project-based interactions or practice periods have better labour market situation after graduation than their peers. The results hold also when controlling of subject field differences and students' abilities.

Research limitations/implications – The study indicates that it is important to look at a wide range of interaction activities and look at the benefits from these activities both in terms of effects on the quality of the learning experience, as well as benefits realised in the transition to work. The data on learning benefits of interaction with WO during higher education are, however, limited, and further studies are needed on this issue in particular.

Practical implications – The study indicates that only certain forms of interactions between students and WO have benefits for students; namely the ones that involve a certain degree of time and commitment. Programme officers in higher education should target more committed interaction forms, because the added value is significantly higher for the students.

Originality/value – The study contributes new knowledge about the external networks of higher education institutions, by looking at the role of students in such networks and by measuring the benefits by using a representative sample of students.

Keywords Higher education, Graduates, Collaboration with work organizations, Labour market effects, Study effects, Work-integrated learning

Paper type Research paper



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Introduction

In Europe, the last decade has seen an enhanced emphasis on networks and collaborative practices in higher education. New types of study programmes with applied and cross-disciplinary profiles have emerged. New programmes often have built-in components such as practice periods, internships, or projects for companies, aiming to meet a diverse set of expected learning outcomes and to enhance the employability of graduates. Such development can be seen in most countries and higher education institutions, and has been spurred on by the Bologna process and by the implementation of the European Qualification Framework (Alesi *et al.*, 2005; Kehm *et al.*, 2010).

For many educational groups, a high degree of interaction between higher education institutions and prospective workplaces has been part and parcel of education since these programmes were first offered. Professional educational programmes, such as in teaching, nursing and medicine, usually have well-developed institutional structures work integration for preparing students for work. What is new, and what we readily observe in our study, is that such work integration practices are now found in most kinds of higher education programmes at the post-graduate level, also in sciences and humanities. Since interactions with prospective workplaces in the private and public sector are now prevalent in higher education, we need to know more about the potential effects as increasing numbers of students are involved in such activities.

There is no common terminology for the kinds of partnerships and networks between higher education institutions and public and private organisations that we target, although university-business partnerships or university-industry partnerships is commonly used. In our study, we do not however limit the discussion to only private businesses, but also include public sector organisations and third sector organisations, as many academic institutions have stronger ties to the public than the private sector. For simplicity we refer to all organisations (both private and public) as work organisations (WOs).

In the research literature, the topic of university-industry interaction has received a fair amount of attention in the last decade, partly as a response to increasing policy focus. Through large-scale surveys of firms, universities institutions, regions or countries and/or academic staff in particular, researchers have attempted to map out the degree of interaction and the type of contacts and collaboration that exists between higher education institutions and firms (or private and public organisations more generally) (Ramos-Vielba and Fernandez-Esquinas, 2012; Hughes and Kitson, 2012). These contributions focus mainly on collaboration in research, knowledge transfer and commercialisation of research. However, interactions that involve students in regular study programmes are neglected in this research, even though students are often regarded as key mechanisms of knowledge transfer between universities and firms. With this neglect in mind, the focus in this paper is on students and their role in interactions with private and public sector organisations during higher education.

The paper aims to make a contribution to the literature on the external networks of universities, by focusing on the students' engagement in education-related networks. There has been limited empirical research that has focused on effects of participating in work-related networks during education. In theoretical work on employability (Dacre Pool and Sewell, 2007) emphasises work life experience during study as a central component of employability. Empirical studies on this issue are, however scarce. Consequently, we aim to make a contribution to the literature on student employability by testing this key assumption.

There is, however, an extensive literature on work-integrated learning in higher education, as well as on factors that influence transition from education to work, which

will be discussed in the paper. Literature on work-integrated learning emphasises a pedagogical perspective, focusing on the learning benefits of integrating work-based and school-based learning. Another relevant stream of literature is related to economics of education and training, and the investigation of unemployment levels and the transition from education to work. These two streams of literature on the value of work-integrated learning and transition to work are not often combined. Further, the possible effects of collaboration with WO during study for transition to work is often neglected, probably because of lack of data. We will however emphasise both; looking at both the potential benefits of interacting with WOs during higher education as well as those benefits that can be realised after graduation in the transition to work. The primary contribution of the paper is that we synthesise literature across a number of research traditions, and then test key assumptions on a representative sample of university graduates from multiple fields of study.

Study and labour market effects of interacting with WOs: theory and hypotheses

Recent research offer several different classifications of work and education interaction activities (Jackson, 2015; Lee *et al.*, 2010; Lester and Costley, 2010; Tynjala *et al.*, 2003; Brandt *et al.*, 2008). One form described by Brandt *et al.* (2008) is interaction with private and public sector organisations to develop new, or change existing, educational courses or programs, to ensure that programs and courses are adapted to the needs to the local labour market. A second form concerns collaboration to deliver parts of the educational programs, through practice periods, project work, joint supervision or teaching, and staff secondments. Third, private and public organisations can also support teaching without being directly involved in the programmes, by providing access to facilities and equipment, development of business case studies, development of projects and dissertation topics. Finally, there is extensive interaction with private and public organisations to facilitate transfer from education to work life in most subject fields, such as company visits, mentoring, career guidance, internships and summer jobs (Brandt *et al.*, 2008).

In this paper, we will focus on the second and third of these areas of collaboration; that is higher education institutions and private and public sector organisations that interact to deliver parts of educational programmes or support teaching in different ways. We emphasise the perspective of the students that participate in such activities, and have asked master's degree graduates to indicate what kinds of work-related interaction activities they participated in during their education, and to assess the benefits of such activities.

Study effects

Initiatives to increase interaction between higher education and work life for educational purposes are described by multiple labels, such as cooperative education, work-based learning and work-integrated learning (Billett, 2009; Lester and Costley, 2010; Lee *et al.*, 2010; Jackson, 2015). There is a considerable research literature on this topic from a pedagogical perspective, and consequently the learning benefits and educational value of integrating work experiences in education is usually emphasised. The general argument is that collaborating with public and private organisations during education might provide students with complementary learning opportunities and resources that higher education institutions are not able to provide (Lester and Costley, 2010; Kessels and Kwakman, 2006). Jackson (2015, p. 350) therefore defines work-integrated learning as

the “practice of combining traditional academic study or formal learning, with student exposure to the world-of-work in their chosen profession”.

Billett (2009, 2011) claims that learning in workplace settings gives students in higher education authentic experiences on how it is to practice the occupations that the students are educated for. From the workplace setting, students will get access to complementary, domain-specific knowledge, which increase the overall learning outcomes for students, dependent on an effective integration, organisationally and pedagogically, between academic and workplace learning. Tynjala *et al.* (2003) address integration of learning in work life and higher education from a theory of learning perspective. Workplace learning can be argued for from several learning theoretical standpoints, and particularly from the socio-cultural learning theories, which argues that learning occurs through active engagement in authentic practices and in social interaction. They argue that development of expertise requires different forms of learning and knowledge acquisition, because different forms of knowledge (both theoretical and practical) need to become integrated (Tynjala *et al.*, 2003; Kessels and Kwakman, 2007; Billett, 2009). Combining learning in universities and at the workplace might therefore offer advantages by strengthening the integration between complementary forms of knowledge and the ability to acquire and practice knowledge and skills at the same time. Work-integrated learning is therefore considered as an important tool in augmenting employability skills in university graduates (Yorke, 2011; Jackson, 2015) and may ease the process of transferring skills from university to workplace (Jackson, 2015).

Gaining relevant work experiences as part of educational programmes might also increase students’ motivation to complete studies, by visualising and making competence needs less abstract (Billett, 2009). By visualising how the knowledge acquired in education is used in practice, and why it is necessary to master a range of knowledge areas and skills, students’ motivation would be strengthened. Sannerud (2009) finds that learning experiences in WOs provide the students with informal and authentic feedback on their competences and areas where further knowledge is needed, something that is seen as beneficial for learning and motivation by students. A study made by Person and Rosenbaum (2006) found that contact with employers during education increased American community college students’ motivation and increased the likelihood of completing a degree. According to Jackson (2015) there is evidence that work integration increases student performance by increasing the maturity and motivation of students. However, this association might be confounded by the fact that more motivated and able students participate in education-work-integration activities to a larger extent than less able students. This is however, a question that warrants further research and it is possible to take it into account if information on grades exists. This applies to the data set used in this paper.

To summarise, we formulate two hypotheses about study effects of interaction with WOs during higher education:

- H1. WO interaction during master’s degree-level programmes complements and strengthens the development of skills and knowledge during study.
- H2. WO interaction during master’s degree-level programmes gives students increased motivation to complete studies.

Labour market effects

In the transition-from-education to work stream of research, relatively little attention is paid to the possible effects of work-integration experiences during education on

later employability. Differences between countries in modes of transitions and unemployment levels are emphasised in this stream of research, and usually explained by factors such as cyclical and structural characteristics, and frequently also according to institutional characteristics of the education system (Wolbers, 2014; de Lange *et al.*, 2014; Raffe, 2014). Differences in the rate of unemployment and over-education by levels and fields of education are also frequently emphasised (Allen and van der Velden, 2011; Verhaest and van der Velden, 2013). It is among other things found that graduating from a vocational-oriented education increases the probability of a good match at the labour market after graduation (Verhaest and van der Velden, 2013; Støren and Arnesen, 2011). The same applies to having study-related (paid) work experience during study (Støren and Arnesen, 2011; Kivinen and Nurmi, 2014). Kivinen and Nurmi analyse the labour market relevance of university studies in 12 European countries, and one of their starting points is that the average enrolment and graduation age varies a lot between the countries. Their conclusion is that in countries with “old” graduates (e.g. Finland and Norway), there is a shorter period between graduation and getting professional employment than in other countries, and they argue that this is largely due to the former’s higher degree of relevant work experience before graduating. This work experience refers to study-related work experience as well as internships.

Other studies find as well that having established contacts with work life organisations during education, for instance in the form of practice periods, has a positive effect on university graduates employment status and salary levels after graduation (Mouw, 2003; Rosenbaum *et al.*, 1990). According to Rosenbaum *et al.* (1990), both market and network theories can contribute to explain these findings. Market-based theories focus on the quality and relevance of the competencies (the human capital) that students offer the labour market when they graduate for explaining different labour market outcomes of university graduates in their early careers. Employers often express that university graduates that have strong academic skills as well as industry or even firm-specific work-related skills as being more attractive than other graduates. This supports the argument made by Billett (2009, 2011) about the complementarity in competencies acquired by integrating work life experiences in academic programmes. Having experiences from particular firms or industries might also give students more knowledge about potential places of work and positions/occupations that are suitable for their educational backgrounds, and this information makes them better and more efficient job searchers (Billett, 2009). However, according to Jackson (2015) there is mixed evidence about the impact of work-integration experiences for post-graduation employment prospects. According to her, prior research has found a positive impact on undergraduate employment prospects but not on graduate employability. Our analyses will concentrate on graduate employability, and the question is whether our analyses will confirm previous results concerning lack of effect of work-integration experiences on graduate employability.

Network theories of transition to work provide another explanation for why interaction with WOs during education is beneficial for transition to work. Network-based studies of job search has showed that contacts – and particularly in the form weak ties (contacts outside family or close acquaintances) – are central for getting access to information about job opportunities (Granovetter, 1995). For students, having contacts to potential employers increase the likelihood of getting information about potential jobs and being seen as potential candidates for new jobs. From the perspective of the employer, interacting with students provide them with a risk free opportunity to search for potential employees and the opportunity to try them out in work relevant situations (Thune *et al.*, 2012).

Based on prior research on transition to work, we formulate the following hypothesis about labour market effects:

- H3. WO interaction during education eases the transition from education to employment; i.e. master's degree graduates that have interacted with WO during education have more favourable labour market outcomes than their peers six months after graduation.

The labour market benefits of having interacted with WO during higher education could be expected to be higher in subject fields with less tradition for such collaborations. The reason for this is that – as mentioned above – graduates from vocationally oriented studies have a better labour market match after graduation than students graduating from general academic fields such as humanities and natural sciences. This implies that for students in generic fields, the competencies and networks acquired by interaction with WOs can be more decisive and unique. As the evidence about the impact of work-integrated learning on employment prospects is mixed, further research should take account of different labour market prospects and career trajectories for different educational groups (Jackson, 2015). We therefore hypothesise that:

- H4. Labour market effects are higher in subject fields with less tradition for WO interaction, i.e. disciplinary and non-applied fields (such as humanities and sciences).

Effects depend on design of WO interaction experiences

Finally, we assume that the benefits that accrue to students who partake in interaction activities vary by the length and degree of involvement on part of the WO. Integration and collaboration between WOs and education can take many forms. Lee *et al.* (2010, p. 536) describes work-based learning or work-integrated learning in higher education as “learning that occurs outside traditional classroom settings supervised by non-academic staff. Delivery modes can include pre-course experience, sandwich courses, cognitive apprenticeships, fieldwork, post-course internships, placements or practicum, internships and cooperative placements”. The learning opportunities offered by these different activities are not likely to be similar, but most of the literature does not distinguish clearly between different modes of interaction or the benefits associated with different forms of interaction. We also rarely get insight into what WOs do when they support students' learning through cooperative initiatives of different forms, as most research emphasises learning processes or learning outcomes (Jackson, 2015; Trede *et al.*, 2013).

From a constructivist perspective on learning, it is argued that activities that offer rich opportunities for students to participate in work-related activities is more significant for learning work-related skills (Kessels and Kwakman, 2007). We assume that opportunities for becoming embedded in work practice require that students spend some time in the WO and that the WO provides support to students. Problem-based learning theories assume that learning is facilitated by working on a real-life problem, which also means that WOs need to define relevant problems and provide students with contextual knowledge, resources and support throughout the project. This clearly also requires commitment of time and resources on part of the WO. The literature on the benefits of work-integrated learning in its many different forms presupposes that its value is dependent on WOs' support and organisation of meaningful learning activities. Jackson (2015) mentions that access to supervisors and colleagues, learning

support and articulation of skill expectations and feedback to students as key resources that host (work) organisations should provide.

We therefore assume that modes of interacting that involve prolonged contact and where the WO has committed itself to create learning opportunities for students (such as prolonged practice periods, or problem-based activities like project work), are likely to carry larger benefits (more opportunities to learn, more contacts acquired) for students than short-term and low-commitment activities (such as lectures, company case studies, use of facilities and equipment) (Bilett, 2009). We formulate the following hypothesis to examine the effects of different modes of interaction depending on the level of engagement of WOs:

- H5.* The benefits that accrue to the students by having WO interaction during education vary by mode of interaction, particularly the length and commitment of the interaction activity.

Methodology and data

Context of the study

The general labour market situation in Norway is good compared to other European countries, and this applies as well to person with higher education (Eurostat, 2015). The unemployment rate among higher educated persons in general is (almost) two per cent, however, among fresh graduates (six months after graduation) the unemployment rate is higher, on average about 7 per cent. Three years after graduation the unemployment rate is decreased, but it is varying between different fields of study (e.g. varying from about 1 per cent of masters in technology to 6 per cent among masters in humanities) (Arnesen *et al.*, 2013). The survey that is used in analyses below refer to the situation six months after graduation. Unemployment is only one of the measures of mal-adaptation that is used in this paper. In addition, a proportion of the graduates (about 5 per cent) have irrelevant work. This means that in total about 11 per cent of the graduates are mal-adapted. The definition of irrelevant work is described in detail later.

To investigate the hypotheses formulated above, we have collected data from a large sample of master's degree graduates from Norwegian universities and university colleges. The sample includes students that have participated in different forms of work-integrated learning and students who have not. There have not been an explicit policy in Norway to promote work-integration in higher education, although a large number of educational programmes in professional fields have a long tradition for integrating work practice in higher education.

Participants and procedures

Information about all graduates from Norwegian higher education institutions in the spring term 2011 were received from the higher education institutions. The survey is one of the biennial graduate surveys six months after graduation conducted by NIFU Nordic Institute for Studies in Innovation, Research and Education. The surveys cover the transition from education to work and the labour market situation. The 2011 Graduate Survey is the only one of the surveys that (so far) has included questions on participation in work-integrated learning and collaboration with WO as a part of their study programme. The labour market situation among fresh graduates has been stable the last years and the general results from the 2013 and 2011 Graduate Surveys were more or less the same (Wiers-Jenssen *et al.*, 2014).

Data were collected through an electronic and mail-based survey sent to graduates that received a master degree (or equivalent) from a Norwegian higher education institution during the spring term of 2011[1]. Stratified sampling was applied for the largest groups, and where the distribution of male and female graduates was very uneven. The data are weighted according to the sampling procedure, and all results presented here are weighted results (except for the number of observations, which refers to un-weighted numbers).

In total, 2,232 master degree graduates responded to the survey, giving a 54 per cent response rate in this group. All subject fields were represented among the master graduates, and nearly all groups of graduates were sampled[2].

Instrument

To gather information on the issues of interest, we constructed two survey questions with multiple items for the independent variable “interaction with WO during education”. The first question concerned what kinds of interaction activities with WOs that the master’s degree graduates had participated in during education. We specifically asked for participation in activities that occurred as an integrated part of the education programme that the students’ had attended. The informants were asked to indicate which activities they had participated in from a list of eight non-exclusive activities (multiple options available) that differ in length and scope of work interaction. The activities included participation in lectures/seminars with external lecturers, field visits, write an assignment/thesis in collaboration with a WO, receive supervision from WO, participate in a research project with WO, and participation in practice periods in WOs – both mandatory and voluntary, and in international organisations. The items were selected based on literature reviewed above about patterns of work-integration in higher education, and interviews with students and academic staff (see Naess *et al.*, 2012 for further information).

The eight items referring to WO-interaction are showed in the Appendix. The questions were designed so that they referred to activities and contacts with the labour market which are directly related to the study programme (see the Appendix), and not to be confused with regular gainful employment. In another question earlier in the questionnaire it was asked about experience with gainful employment during study. There, it was emphasised that jobs that were obligatory or a part of required educational practice for the study programme should not be included as gainful employment. Required educational practice is covered in the questions concerning contact with firms and public sector organisations (see the Appendix).

In the analyses, the eight items are merged into three categories to distinguish different levels of engagement and type of interaction activities: short/limited engagements, project-based interaction and practice-based forms of interaction. Short/limited interaction activities mean participation in activities that are short in time and represent limited investments from both the student and the WOs. Lectures, talks, field visits and excursions represent short, limited interaction activities. Project-based and practice-based forms of interaction are similar in the sense that they represent more investments of time and resources on part of both the students and the WO, but they differ in content of the interaction. Project-based interactions are interactions where students work on a research assignment – usually a term-paper, master dissertation or a project report, either on behalf of the WO or in collaboration with the WO. This also entails receiving supervision or mentoring from a responsible person in the WO.

Practice-based interaction forms are time periods spent in a WO doing ordinary work tasks to support and supplement learning in class. These can be both mandatory and voluntary. In the latter sense, internships and unpaid summer-jobs of relevance to a study programme, can be included. These activities have a more explicit aim to provide the students with work-related skills and experience from actual work, and is therefore the category that most resembles work-integrated learning (Jackson, 2015).

For the dependent variables (study and labour market effects) we utilise both subjective and objective data. First, we asked the graduates for their assessment of the benefits of the WO interaction activities they had attended. Here the informants were asked to indicate whether they thought interacting with WO carried particular benefits using a five-point scale, ranging from not useful at all (value 1) highly useful (value 5) (A sixth category “I do not know”, amounting to 3-4 per cent, were treated as missing and not included in the analyses of these questions.) The selection of items of benefit was based on review of literature about the benefits of cooperative education and work-integrated learning, as reviewed above. We explicitly included statements of benefits that could be expected to be realised during education (motivation, learning, practical skills) and benefits that is expected to be realised in transition to work (networks and contacts, understanding of relevant work tasks and occupations, job opportunities, skills necessary for transition to work). Eight statements of potential benefits were stated; training in practical skills, understanding of relevant occupations and tasks, networks and contacts outside university, increased motivation to complete studies, ideas for potential careers or academic specialisations, concrete job opportunities, ability to cope with transition to work.

In addition to the analyses of the (subjective) data on perceived benefits of WO-interaction, possible study effects are examined in terms of the likelihood of completing study on time, by the use of binary logistic regression model. The graduates were asked to indicate whether they had completed their study programmes “on time”, or if they had used more time than the prescribed time.

Finally, the last dependent variable concerns the likelihood of being mal-adapted on the labour market. The possible effect of WO-interaction on the labour market situation is examined by the use of binary logistic regression. The graduates were asked about their employment situation six months after graduation. In this question, the graduates responded according to a specific week in November 2011, i.e. “the reference week”, which was approximately six months after graduation. They were asked if they were employed, or unemployed and seeking work at that time. If they were employed, they were asked about the extent to which the job they then held corresponded to the level and content of their education. Based on this, and on information of the reasons why they possibly had a job that did not correspond to the level and content of their education, and new category was constructed, that is involuntarily holding irrelevant work. Involuntary irrelevant work has a strict definition. The definition only includes graduates who report that: higher education is irrelevant for the job; the content of the education they completed in the spring of 2011 did not at all corresponded with the work they do in their current job; and it had not been possible to find relevant work. The two categories unemployed and involuntarily irrelevant work constitute being “mal-adapted” in the labour market, and are compared to those who were employed in relevant work.

Other relevant information about the respondents (age, gender, grades, fields of study, university attended, and work experience prior to graduation) is used as independent variables in the regression analyses, in addition to three dummy-variables referring to WO-interaction.

Results

Participation in WO interaction activities

In total, 77 per cent of master's degree graduates state that they have participated in at least one WO interaction activity during education (non-respondents calculated as non-participants). The level of participation differed by categories of WO collaboration. 64 per cent of the master students had participated in short, limited engagement activities (attended lectures and field visits). In total, 53 per cent had participated in project-based activities (written a dissertation or project assignment, participation in collaborative research, or received supervision on dissertation). 34 per cent had practice periods (voluntary or mandatory) in a WO.

The kinds of collaborative activities the graduates have participated in differ by educational groups, as seen in Table I. The large majority of graduates in all subject groups have participated in WO interaction activities, with the exception of graduates with a degree in humanities where only 50 per cent of the graduates report to have participated in at least one of the activities. Short, limited engagement activities were common in most groups of graduates, but less common among graduates in humanities and education/pedagogy than in other groups. Project-based interaction is quite common in most educational groups. However, amongst the graduates with a degree in humanities, only 31 per cent had participated in such activities, compared to subject fields such as business and administration, social sciences, natural sciences and engineering, where more than half of the graduates had been involved in a project-based interaction with a WO during education.

Practice periods was most common for graduates in education/pedagogy and health-related subject fields, but more than 30 per cent of graduates in subject fields such as social science, law studies, natural sciences and sports sciences also report to have had mandatory or voluntary practice periods in a WO during education.

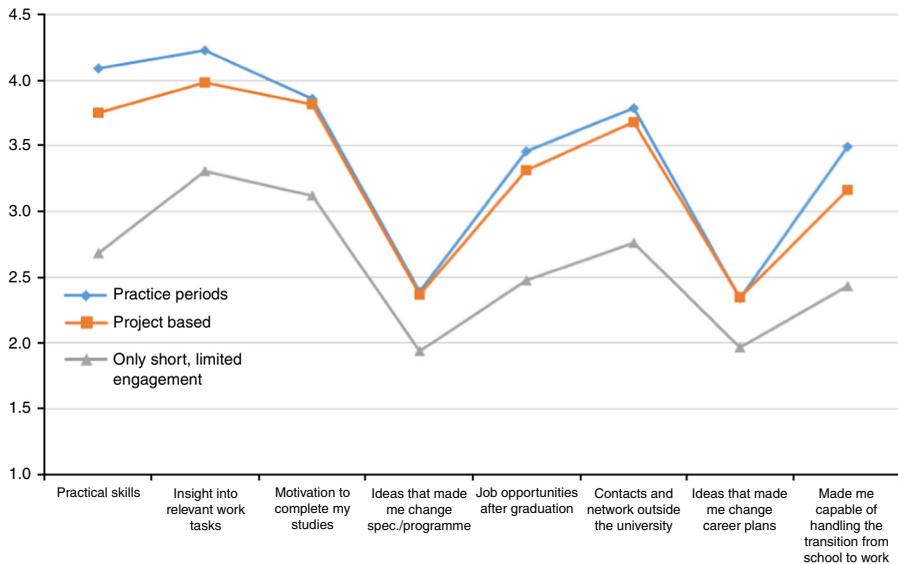
Perceived benefits of WO interaction

As mentioned above, the graduates that reported having participated in at least one form of WO interaction, were also asked to assess the possible benefits of having participated in such activities on an eight-item question with five-point scales. Not surprisingly, the highest rated item was that participating in a WO interaction activity had given the graduate's "insight into relevant work tasks", followed by "motivation to complete my studies", "practical skills" and "contacts and networks outside the university". The assessments varied, however, considerably by type of WO interaction (see Figure 1).

	All types of collaboration	Short, limited engagement	Project based	Practice periods	No. of graduates (N)
Humanities	49.7	35.7	31.0	28.4	353
Pedagogy	69.6	41.5	40.8	49.1	214
Social science	81.1	65.0	54.8	33.2	375
Law	79.0	74.9	42.1	31.6	95
Business and administration	87.4	81.2	64.8	18.4	239
Natural science and technology	85.7	78.7	62.1	37.9	553
Health and welfare	78.2	53.9	58.4	41.1	302
Sports	69.2	53.8	50.0	28.8	52
Other (primary industries, service, communications)	93.9	85.7	77.6	24.5	49
Total	77.2	63.8	53.3	33.9	2,232

Table I.
Percentage of
master's degree
graduates that
had interacted
with WO, by
educational groups

Figure 1.
The graduates' assessments of the usefulness of WO collaboration (scale 1-5), by type of interaction



As described in the theoretical framework, we expected that the benefits associated with different modes of interaction to vary, and particularly the length and commitment put into the collaboration (*H5*). Figure 1 illustrates that the benefits reported by the graduates differ in the three categories of interaction modes.

Being involved in practice periods or project-based interaction, result in significantly higher scores than if the graduates have only been involved in short and limited engagement activities. On all the expressions (items) of usefulness the latter group scores lower than the others. Graduates that have taken part in practice periods or project-based interactions particularly report higher degrees of usefulness on items such as learning practical skills, insights into relevant work tasks, increased study motivation, contacts outside the universities and job opportunities.

These results provide some initial support to our hypothesis that work life interaction has a positive influence on learning outcomes, study motivation and transition to work, and that the benefits differ by mode of interaction. However, the data also provides an opportunity to examine the possible effects on study progression and labour market situation regardless of the students' subjective assessment of usefulness.

Study and labour market effects of WO interaction

To investigate effects of WO interaction we examine whether the graduates had completed on time as well as their labour market situation after graduation. The answers to a question in the survey, on whether the graduates had completed on time, are here used as a proxy for study motivation. We examine whether WO interaction had contributed to increase the probability that the student completed their study on time; i.e. whether it might have contributed to motivate the students to complete their study. A contrary expectation could be that such interactions would delay the students.

The relationship between labour market situation and prior participation in WO interaction activities is examined by the unemployment rate as well as the per cent who were employed in (involuntary) irrelevant work six months after graduation. Those two

categories constitute being “mal-adapted” in the labour market, and are compared to those who were employed in relevant work. Descriptive statistics of the two dependent variables (completion on time and labour market situation) are shown in Table II.

Table II indicates that the proportion of graduates who had completed their studies on time was higher among those who had taken part in interaction activities than among graduates who had not participated in such activities. Further, Table II indicates that this applies to all types of WO activities. This will be further examined below, but we may conclude based on the initial analyses in Table II there is no indications that participation in WO interaction delay the students.

Moreover, the results of Table II also indicate that WO activities reduces the risk of being mal-adapted on the labour market, and that this particularly applies to committed activities such as project-based collaboration and practice periods.

Patterns of interaction, and the degree of unemployment as well as the extent to which the graduates are holding (involuntary) irrelevant work, vary by educational fields. The relationship between mal-adaptation in the labour market and fields of study is displayed in Figure 2.

The effects of having experience from WO collaboration seem to be most positive for master’s degree graduates in fields where it is short tradition for WO collaboration

	No interaction	Short, limited engagement	Project based	Practice periods	All
<i>Completion on time</i>	63.2	73.8	73.3	72.9	70.6
Number of observations	525	1,389	1,163	778	2,227
<i>Labour market situation</i>					
Unemployed	6.9	5.8	4.5	4.1	5.9
Employed, but irrelevant work	6.9	4.7	3.4	2.9	4.9
Mal-adapted, total	13.8	10.5	7.9	7.0	10.8
Number of observations (persons in the labour force)	489	1,350	1,132	758	2,140

Table II. Completion on time, and labour market situation of master degree graduates six months after graduation, by mode of WO interaction during study (per cent)

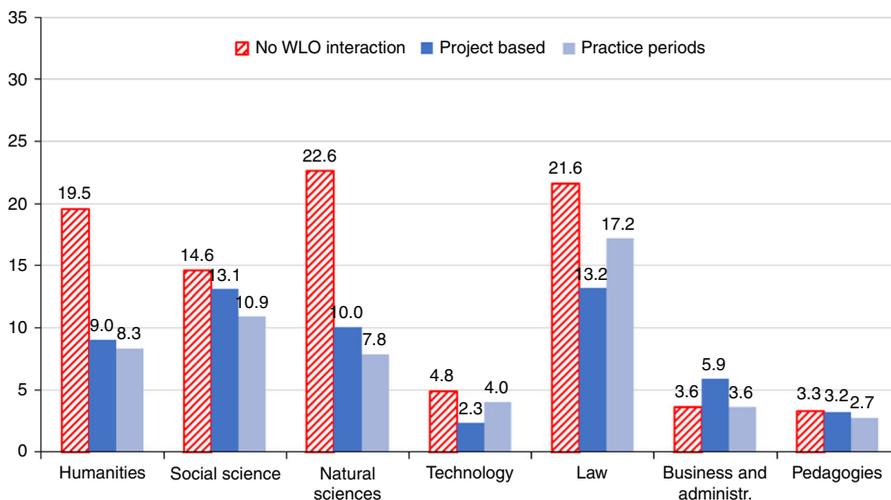


Figure 2. Per cent mal-adapted (unemployed or in irrelevant work) among master degree graduates six months after graduation, by fields of study and modes of WO interaction during study

(not professional and not applied fields). For graduates in humanities, natural sciences and social sciences, having interacted with WO during education significantly reduces the risk of being mal-adapted (being unemployed or holding irrelevant employment).

An additional finding is that WO collaboration seems to particularly reduce the risk of being mal-adapted among groups who face the largest difficulties as newcomers on the labour market (graduates in humanities, natural sciences, social science and law). In other educational groups, representing professional and applied fields with long tradition for WO collaboration, such as master degree graduates in health, education and business and administration, the proportions having relevant employment are generally high. For these groups the effects of WO interaction during study is limited or non-existent.

Results of regression analyses

It was expected in *H2* that WO interaction during education would give students increased motivation to complete studies. In *H3* it was expected that having participated in WO interaction during study is associated with lower proportions of graduates that are mal-adapted (unemployed or employed in irrelevant work) on the labour market after graduation, and in *H4* it was expected that these labour market effects would be higher in subject fields with short tradition for WO collaboration. In *H5*, it was expected that the benefits – both study and labour market benefits – would vary by mode of WO interaction, and that interaction forms with some length and commitment on the part of the work life organisation would carry the most benefit for the students.

Table II and Figure 2 provide initial support for these hypotheses. Since completion of studies as well as employment status after graduation are also influenced by other factors, such as gender, age, previous labour market activity (before graduation, during studies) and fields of study, we control for these variables in a logistic regression analyses (Table III), in order to examine *H2*, *H3* and *H5* further[3]. In these analyses, we are particularly interested in the effects of modes of WO collaboration, i.e. the length and commitment of the interaction activity (see *H5*). The regression analyses allows for examining the isolated effects of different types of WO interaction.

Considering the probability of completing study on time (*H2*), the effect of project-based collaboration is positive and significant. However, short, limited engagements and practice periods have no significant effect on the probability of completion on time when also controlling for other factors (Table III, the first column).

Also included in the regression analyses are controls for having paid work prior to graduation. Work experience is divided into two types; paid work that was relevant for their study programme, and paid work that was not relevant to their study programme. Having experience with relevant paid work during study reduces the chance of completing studies on time. Irrelevant paid work before graduation has no effect on the probability of completion studies on time.

In the analyses of the probability of completing study on time controls for grades from upper secondary education are included. This information is based on categorical data, hence, dummy-variables referring to the best and second best grades, are included. As seen, those with the best grades have increased likelihood of completion on time. We consider that grades from upper secondary (intake grades) serve as a more relevant control factor than final grades when graduating with a master's degree when we take into account the possible relationship between the students' (underlying) ability and participation in WO-interaction.

	Completing studies on time		Being mal-adapted on the labour market		Study and labour market effects
	<i>B</i>	SE	<i>B</i>	SE	
<i>WO collaboration</i>					
Short, limited engagement	0.097	0.099	0.433	0.156	715
Project based	0.237	0.093	-0.577	0.143	
Practice periods	-0.118	0.094	-0.571	0.157	
<i>Paid work before graduation</i>					
Only irrelevant work experience	-0.061	0.143	0.198	0.175	
Relevant work experience	-0.356	0.129	-1.222	0.190	
<i>Fields of study ("other fields" = ref.)</i>					
Business and administration	0.383	0.290	-0.607	0.422	
Technology	0.117	0.301	-0.879	0.454	
Natural sciences	0.142	0.287	0.028	0.401	
Law	-0.491	0.308	0.339	0.427	
Humanities	-0.041	0.289	0.418	0.410	
Social science	0.030	0.284	0.293	0.397	
Pedagogies/education; health and welfare	0.687	0.288	-0.289	0.417	
Sports and physical education	0.792	0.462	-0.048	0.659	
Female (= 1)	0.008	0.089	0.081		
Age	-0.403	0.043	0.397	0.088	
Age squared	0.005	0.001	-0.005	0.001	
Grades, upper secondary, second best (= 1) (else = 0).	0.022	0.100			
Grades, upper secondary, best (= 1) (else = 0)	0.344	0.152			
Grades when completing HE (Scale 1–5, 5 is best)			-0.221	0.090	
Constant	8.492	0.821	-7.491	1.592	
Pseudo R^2 (Nagelkerke)	0.128		0.153		
No. of observations	2,227		1,993 ^b		

Table III.
Binary logistic regressions of the probability of completing studies on time, and of being mal-adapted on the labour market six months after graduation^a

Considering mal-adaptation in the labour market ($H3$), the regression analysis (Table III) shows that that project-based WO collaboration reduces the risk of mal-adaptation. It is also clear that practice periods reduce the risk of labour market mal-adaption. Short limited engagement seems, to some extent, to increase the risk of mal-adaptation when controlling for other factors.

It is the variable “having experience with relevant paid work during study” that has the greatest impact of all the control variables on the labour market situation. It strongly reduces the risk of being mal-adapted on the labour market after graduation. Experience with irrelevant paid work before graduation has no effect.

It is interesting to note that the effects of the different independent variables on “completion on time” and “labour market mal-adaption” frequently are complementary. Variables that has negative effects on mal-adaption (i.e. increasing the probability of having relevant work), have quite frequently positive effects on “completion on time”. One example is that project-based WO collaboration reduces the risk of mal-adaptation,

whereas it increases the probability of completion on time. This is in accordance with our expectations.

In the analyses of the probability of mal-adaptation, the final grades from HE is included as control variable, since here this is a more relevant factor than the grades form upper secondary. Additional analyses showed that grades form upper secondary were of no significance (“all other things equal”).

Controls for type and localisation of the higher education institution are not included in Table III. However, this was done in preliminary analyses, because in many countries a stratified higher education system has impact on the labour market situation of the graduates in terms of better chances for those graduating from the most prestigious institutions. This effect is however minor in Norway. Preliminary analyses, controlling for whether the graduates graduated from a university or a university college, and whether the institution was located in Oslo or other parts of the country, revealed no significant effects on the graduates’ labour market situation.

We can conclude on the basis of Table III that having established contacts with work life during education through participating in practice periods or project-based collaboration contribute to making the transition to work after graduation smoother and reduces the risk of unemployment/employment in irrelevant work, and that the effect differ by mode of interaction and field of education. The results of the regression analyses also confirm that there is an effect of WO interaction on the probability of completion on time; the positive effect is however limited to project-based collaboration.

Discussion and conclusion

The paper has addressed the issue of higher education graduates’ interaction with work life organisations during higher education and potential benefits of such interactions for students, focusing on master’s degree students. This topic is relevant as increasing numbers of national educational authorities and higher education institutions develop programmes and practices to facilitate better integration between education and work, through cooperative student placements, project work, collaborative diploma and master projects and related mechanisms (Tynjala *et al.*, 2003).

Studies of collaborative relations between higher education institutions and firms (and/or public organisations) are usually quite descriptive and tend to map out in detail the many and varied forms that interactions occur and that the modes of interaction vary by fields of studies and economic sectors. With some exceptions (Butcher and Jeffrey, 2007; Thune, 2011), such studies tend not to focus on education-related forms of collaboration or students’ perspectives. This study provides an auxiliary perspective to the general literature of higher education–business relationships, by pointing to the prevalence and importance of interactions involving students. 77 per cent of master’s degree graduates surveyed have – to some extent – interacted with public and private organisations as an integrated part of their education. As this is quite a prevalent phenomenon, we need more knowledge about such types of interactions and the impacts they possibly have for students and study programmes. To formulate expectations about benefits of WO interaction during higher education, we reviewed quite disparate strands of literature.

Research on work-based or work-integrated learning (Tynjala *et al.*, 2003; Billett, 2009, 2011; Lester and Costley, 2010; Jackson, 2015) or “coop education” (Kessels and Kwakman, 2007) focus on the educational value of integrating work-based learning and university-based education, and tend to focus on the enhanced learning opportunities that such experiences can bring to students. Such studies are either conceptual or based

on a limited number of empirical studies, reflecting also the fact that it is hard empirically to isolate the effects of one particular learning activity in the wider stream of learning activities that make up higher education (Tynjala *et al.*, 2003). These authors argue that learning through experience in authentic situations of practice is beneficial for students' learning (Billett, 2009, 2011) and that it enable an integration of theoretical and practical knowledge (Tynjala *et al.*, 2003). Also small scale studies of particular programmes, initiatives or student groups have provided information about positive learning benefits of interaction (Lee *et al.*, 2010; Jackson, 2015) with work life during education, but we would still argue that further research using larger samples is necessary.

Based on this literature, we formulated a positive expectation about the benefits of WO interaction during education, in terms of increased learning outcomes (*H1*) and increased study motivation (*H2*), but assumed that the benefits would vary by modes of interaction (*H5*). To test them we utilised data from a cohort survey of Norwegian master's degree graduates, which addressed graduates' WO interaction, experience and reported benefits, as well as data on completion time and labour market situation.

Unfortunately, we do not have specific data on students' learning outcomes, which would make it possible to conduct an adequate test of *H1*. The survey confirms, however, that students who have participated in such activities report positive outcomes in terms of learning of practical skills and increased study motivation (see Figure 1). Such data are however problematic to use as indicators of effects, as there is no comparative data for groups who did not interact; further, such data may reflect attitudes rather than behaviour or skills. Still, we have seen that the reported benefit of WO interaction is higher for those with long and/or committed WO interaction (project based and practice periods) than for graduates with only short and limited engagement. This provides some support for *H1* concerning increased learning outcome and complementary competencies.

Another potential effect of WO interaction on students' behaviour – increased study motivation – is also emphasised here (*H2*). Both prior empirical research and conceptual work had indicated a positive effect of WO interaction (Billett, 2009; Person and Rosenbaum, 2006; Jackson, 2015) on study motivation. To extend empirical research on this issue, we operationalised the study motivation variable, both in terms of a self-assessment question and whether the study was completed on time. The self-assessments by students indicate that students who have interacted with WO see increased study motivation as an important benefit. However, the estimates of the proportion of students who had actually finished their degree on time does not provide very strong evidence in favour of *H2*. Still, a significant difference between collaborators and non-collaborators in terms of time to degree is found for some groups. In the regression analysis (Table III) we find that project-based collaboration has a positive effect on completing studies on time, when controlling for other factors. However, we did not find any significant effects of practice periods or short limited engagements. There is need for further empirical research on this issue that unpacks study motivation and completion, and how having experiences from work life might influence motivation.

The relationship between work experiences during education and labour market situation after graduation has been addressed in previous research (e.g. Kivinen and Nurmi, 2014). Paid relevant work during study increases the chance of a good labour market situation after graduation. It is assumed that such experiences might provide students with relevant competencies and networks, which is assumed to be particularly

valuable for getting the first job after graduation (Rosenbaum *et al.*, 1990; Granovetter, 1995). Our analysis supports these assumptions concerning the effect of experience with relevant paid work during study. Further, we find that this does not only refer to experience with relevant paid work, it refers as well to collaboration activities between higher education and WOs. When looking at a cohort of master degree graduates, we find clear support for a positive relationship between WO interaction experience during studies and having a good labour market situation after graduation also when controlling for paid work experience before graduation.

We extend this analysis by indicating that this effect differs by the type of collaborative relationship, and find that only collaborative relationships that persist over some time have such positive effects, as was expected in *H5*. Practice periods as well as project-based collaboration reduce the likelihood of being mal-adapted in the labour market.

Another finding (see Figure 2) is that the labour market effect differs by educational groups, and that it is primarily found in education groups that have short tradition for WO collaboration, as expected in *H4*. We also find that the impact of WO interaction on study- and labour market outcomes are complementary; and in particular, we observe that project-based collaboration forms has a significant and positive impact on completion of studies on time as well as reduces labour marked mal-adaptation.

This study based on a large and representative sample of master's degree graduates shows that student interaction with WOs as an integrated part of their higher education is highly common. Some forms of interactions, which we label project based or practice periods have significant and positive study and labour market effects, whereas short/limited interactions do not. The main contribution from this research is that the study across multiple fields of studies, and not only professional and applied fields, clearly indicates that only certain forms of WO interactions have benefits for students; namely the ones that lasts for some period of time and involves a certain degree of commitment from the WOs. This supports the notion of Jackson (2015) that the design of work interaction experiences matter a lot. In our study we find that particularly project-based interactions have benefits for master students' completion times and transition to work, whereas practice periods mainly has a positive effect on transition to work and not on completion on time. The importance of project-based interaction forms might be particularly important on the masters' degree level, and particularly in academic study programmes, as it at the same time contributes to fulfilling the academic goals of master degree programs as well as preparing the students for work. But clearly a lot of work – education interaction activities that students are exposed to do not have benefits that we can observe, but serves a role in informing students about potential careers and employers. We therefore argue that academic teachers and programme officers in higher education institutions should target more committed interaction forms, such as project-based interactions and practice periods because the added value is clearly higher for the students.

However, the study has several shortcomings, particularly with respect the lack of adequate indicators on learning outcomes, which is seen as the more important benefit in the pedagogical literature on work-integrated learning. We have looked at study motivation, as indicated by the proxy completion on time, as well as a range of subjective indicators of educational benefits. We do however consider that there is need for indicators that captures better the added value in terms of supplementary competencies that students acquire by interacting with WOs during education. To measure effects one would also need to include a wider range of control variables, such

as initial study motivation and career ambitions, which likely have an influence on prevalence to participate in such arrangements and perceived benefits (Jackson, 2015). We have however made a contribution to disentangle the issue of selection bias and effects of work-integrated learning (Jackson, 2015), as we were able to take into account the students' ability as measured by their grades. We find that there is a positive relationship between interaction with work life during education and completion time also when controlling for the students' intake grades (grades prior to higher education). The same applies to transition to work. The association between having a good labour market situation and WO interaction during education still holds when controlling for their grades when graduating from a masters' degree programme.

Further work, both conceptual and empirical, needs to look more into the relationship between the variables, and should also take into account different stakeholders' perspectives, including employers and academic staff, for a more extended perspective on benefits of WO collaboration during education. Questions that should be examined more closely, is why this is useful for both students and employers; what type of cooperation that is most beneficial, and how university-WO interaction can be further developed in fields such as the humanities. Also, in this study we did not look into how different kinds of organisations, such as private firms vs public organisations, work as arenas for students' learning. This should also be addressed in further research.

Notes

1. The questionnaire was also sent to two groups of bachelor's degree students (in business economics and engineering), but they have been omitted from the analyses presented here, because a large proportion of them are still in education.
2. There are two exceptions; medical students (because they do their internship when the survey is conducted) and graduates from the private institution the Norwegian School of Management (because this institution did not want to participate).
3. $H4$ (where it was expected that the effects of WO collaboration would be larger for educational groups in fields where it is short tradition for WO collaboration) is not examined in the regression analyses, because this would have implied the inclusion of many interaction terms of fields of study and WO collaboration in the regression. $H4$ is supported by the results displayed in Figure 2. We have deliberately not included interactions terms in the regression analysis, of many reasons. The table would be unreadable if 12-14 interaction terms were included, and it would result in high standard errors and many non-significant coefficients because of the limited number of responses. In addition, some scholars warn against including interaction terms in logistic models (Ai and Norton, 2003).

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(The Appendix follows overleaf.)

Table AI.
Did you participate in any of the following activities during your study programme?

	Per cent of master's degree graduates answering yes
I wrote a paper/dissertation (project report, bachelor/master dissertation) in collaboration or on a contract with a firm/public sector organisation	33.8
I participated in lectures/seminars held by a lecturer from a firm/public sector organisation	63.0
I received supervision from a person in a firm/public sector organisation	39.9
I participated in a research project in collaboration with a firm/public sector organisation	23.0
I participated in visits/excursions organised by or to a firm/public sector organisation	35.1
I had a mandatory work placement/internship in a firm/public sector organisation	25.7
I had voluntary work placement/internship in a firm/public sector organisation (unpaid)	12.2
I had in work placement/internship in firm/public sector organisation outside Norway	6.3

About the authors

Dr Taran Thune is a Senior Research Associate in the Centre for Technology, Innovation and Culture at the University of Oslo and a Research Professor at the Nordic Institute for Studies of Research, Innovation and Education. She is the author of many scientific papers and reports on university-industry interaction and public-private networks in research and education, in journals such as *Industry and Higher Education*, *Journal of Higher Education*, *Minerva*, *Science and Public Policy*, *European Planning Studies*, *Journal of Technology Transfer* and the *Journal of the Knowledge Economy*. Dr Taran Thune is the corresponding author and can be contacted at: taranmt@tik.uio.no

Liv Anne Støren is a Research Professor at the NIFU (Nordic Institute for Studies in Innovation, Research and Education). She has undertaken research on transition from education to work, education-job mismatch/match; entrepreneurship education and the relationship between competencies and innovative behaviour; educational choices among immigrants and labour market prospects among immigrants, and lifelong learning.

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