Between two advisors:
Interconnecting academic and workplace settings in an emerging field

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Abstract

This article examines a new training design for continuing professional development that aims to support the learning of the novel knowledge and skills needed in emerging professional fields by interconnecting academic and workplace settings. The training design is based on using two advisors, one from working life and the other from an academic context. The article examined whether participants' personal orientation to adaptive expertise predicts the success of a guidance process. The interconnection of workplace and academic contexts was expected to occur through guidance practices. In addition, the features underlying the most successful guidance relationships were analysed. Data were collected by conducting repeated semi-structured interviews with eighteen course participants, eight academic advisors and eight workplace advisors in the context of a one-year energy efficiency training programme. The results indicated that a trainee's personal orientation towards adaptive expertise is a significant component in successful guidance processes. An interconnection of workplace and academic knowledge and practices was hardly found in the guidance provided by each participant's academic and workplace advisors. The feature underlying the most successful guidance relationships are related at the personal, dyad and context levels. An excellent match between the expert profiles of the learner and the advisor appears to be especially critical for successful guidance and powerful knowledge exchange in emerging fields. However, finding matching advisors is often challenging. Many problems are presumably solved if these 'right persons' can be found and if the trainees are themselves oriented to utilise the novel resources provided to them by the advisors.

Keywords: Professional guidance, interconnecting academic and workplace settings, emerging fields, procedure with two advisors, orientation to adaptive expertise, continuing professional development

Introduction

Changing working environments and the new kinds of problems and challenges faced in contemporary society have transformed the nature of existing professions and produced totally new occupations and professional fields. The question of how to prepare workers to meet the new requirements of a changing world and their future working lives is essential, especially in emerging fields where there are no established education programmes or professional pathways for developing expertise (Removed for double-blind review). The lack of shared and certified knowledge, recognised experts and accredited institutions causes challenges for organising education in these fields. In addition to those who are in the beginning of their professional careers, more experienced professionals also often face novel challenges and a need for professional development due to rapidly changing working life requirements. Traditionally, models of continuing education have been either purely work-based or theoretical in nature, and as such, these educational systems may not be sufficient for developing the capacities that are needed for managing novel and changing occupational practices in emerging fields (Choy, Smith and Kelly 2014; Removed for double-blind review). This study focuses on examining a new training design for professional development at the continuing education level that aims to support the learning and development of the new knowledge and skills needed in emerging professional fields by interconnecting academic and workplace settings. The training design is based on the use of two advisors, one from working life and the other from an academic context.

Workplaces have traditionally been important places for cultivating and developing professional skills (Tynjälä 2013; Eraut 2007). Practice settings can provide a range of situation-specific experiences and enable the cultivation and sharing of efficient techniques and practices (Billett 2008; Choy, Smith and Kelly 2014). However, only a few workplaces are able to provide opportunities for improving conceptual and other knowledge-laden aspects of professional competencies and thereby provide possibilities for learning the novel skills and complex competencies needed in emerging fields. Therefore, it has been acknowledged that deeper interaction and new forms of cooperation between higher education institutions and working life—that is, combining the scientific knowledge and expertise of universities and the know-how of experts in workplace settings—could help to develop and distribute new kinds of competencies and innovations and thus provide one possible answer for meeting future educational challenges (Billett and Henderson 2011;

Removed for double-blind review; Jensen, Lahn and Nerland, 2012; Kessel and Kwakman 2007; Removed for double-blind review; Tynjälä, Välimaa and Sarja 2003; Välimaa 2006).

The educational value of connecting learning within educational institutions with practice-based experiences in workplaces has already been acknowledged for those who are beginning their professional careers (Billett and Henderson 2011; Endedijk and Bronkhorst 2014; Poortman, Reenalda, Nijhof, Loek and Nieuwenhuis 2014). In continuing education, an attempt was initiated in Finland in 2009 to address the requirements of the future education of those professionals who are already pursuing professional expert tasks but must expand their skills and knowledge-based competencies and update their expertise (Removed for double-blind review). This training design, which we call Academic Apprenticeship Education, was funded by the Ministry of Education and Culture in order to develop the extensive continuing education programmes nationally. The training design was geared towards the fields that are located in the borderland of universities and working life organisations that are often multi-scientific, rapidly changing in nature and cope with complexity by capitalising on both scientific and practical knowledge. Its objective was to strengthen the cooperation between working life and higher education institutions and to connect learning within these two frameworks.

Approximately 70–80% of the active time usage of the trainees was expected to occur at their workplaces. Workplace learning was complemented with contact days organised by the universities, which included lectures and group work (see Removed for double-blind review). In addition, the interconnection of practical working life competence and theoretical knowledge was supported by relying on a procedure including two advisors; that is, the participants are assigned a professional advisor from their workplace organisation as well as an academic advisor on behalf of the universities. The aim of the procedure in using two advisors is to bring the workplace and academic contexts closer to each other and, by providing both solid research-based and practical knowledge, to assist the participants in deepening their professional skills and competencies. Thus, the procedure aims to support the participants in cultivating the new forms of expertise that are needed in their future working life (e.g. developing adaptive competencies that enable participants to transcend existing practices) (see Removed for double-blind review).

This article focuses on examining the procedure with two advisors in the context of an energy efficiency training programme. Energy efficiency is an excellent example of the new, rapidly developing knowledge-intensive fields. The driving forces leading to the emergence of the new fields are related to new societal needs and challenges, technological development

and innovations as well as changes in legislation (Removed for double-blind review). For example, energy efficiency requires actors to significantly deepen their expertise to meet the emerging demands of efficient energy usage, new national and international standards and changing legislation. Like other new professions, energy efficiency has emerged through the intersection of several professional domains, which means that one unified system or shared body of common knowledge to direct professional activity has yet to emerge (Carlile 2004; Edwards 2012). Instead, interdisciplinary knowledge, negotiations across disciplinary boundaries and cooperation between professionals form diverse fields mastering varying bodies of expertise play an important role in professional activity. Therefore, in energy efficiency as well as other emerging fields, professional development is often embedded in the deliberate creation and cultivation of versatile professional connections.

Advice and detailed feedback from more experienced and competent actors play a central, systemic role in developing the highest levels of expertise (Removed for double-blind review). Advisory processes taking place in workplaces are traditionally examined and discussed from the perspective of older and more experienced workers supervising newcomers and newly qualified employees (Billett et al. 2012). In new and emerging fields, however, there are rarely other experts in the workplace. As a consequence, symmetric knowledge advancement of participants with complementary competences is more typical than the one-directional transfer of knowledge from masters to novices (Scardamalia 2002). In such cases, advisors from outside the workplace may have an important role in facilitating professional learning and development (Hughes 2004). One example of this kind of shared guidance in supporting professional learning are the programmes of work-based doctorates in which the responsibility of supervision has been split between an advisor from a university and an internal or external specialist who has insights on the contextual issues with which the trainee is working (Costely and Lester 2012). It seems that these programmes provide benefits both for the candidate's personal and professional growth and for the employing organisation.

Successful guidance is often a complex process that includes intellectual and affective dimensions, and exemplary advisors act more as mentors than supervisors (Boud and Costley 2007). According to learners' perceptions, the features of successful guidance processes that have a positive impact on learning outcomes in academic contexts are related to the advisor not only being competent in the field but also being accessible, helpful, socialising and caring (Barnes, Williams and Archer 2010). However, the success of supervision is not solely dependent on how the advisor behaves; the student's or trainee's own active orientation is

likewise important (Gruber et al. 2008). When preparing for demanding emerging professional practices, the participant's own orientation towards deliberate practice—that is, his or her adaptive expertise, efforts towards intentionally improving and extending his or her skills, working at the edge of his or her competencies and regulating and reflecting his or her individual behaviour (Ericsson 2006)—either facilitates or hampers a successful supervision process. We will elaborate on this point further below.

In this article, we characterise professionals oriented towards extending their skills and competencies for dynamically adapting to transforming professional environments as adaptive experts. We integrate the approaches found in Bereiter and Scardamalia (1993), Billett (2008), Ericsson, (2006), Removed for double-blind review, Removed for double-blind review, Hatano and Inagaki (1986) and Ohlsson (2011). Cultivating practices of adaptive expertise is critical because there is no direct link between the length of professional careers and the level of competence, and thus many professionals may be characterised as 'experienced non-experts' rather than experts (Bereiter and Scardamalia 1993; Ericsson 2006). Reaching the highest levels of expert performance requires accumulating the following types of experience: a) actively seeking out challenges providing learning opportunities; b) putting efforts into obtaining an in-depth conceptual understanding of the problems encountered; c) working at the edge of competence and constantly stretching performance to continue learning and d) self-regulating and reflecting on evolving professional competencies. Adaptive experts systematically aim at creating and building new knowledge and practices instead of simply relying on previously adopted routines or monotonic learning (Bereiter 2002; Removed for double-blind review; Removed for double-blind review; Ohlsson 2011). They are likely to develop tight ethical and normative criteria for professional conduct (Gardner, Csikszentmihalyi and Damon 2001), systematically questioning and problematising the prevailing routines and practices to find alternative solutions and novel perspectives (Removed for double-blind review). Moreover, adaptive expertise may be understood as adopting an innovator's social role in the workplace community (Mieg 2006), creating networking connections with proximal and distant experts and expert communities in a way that is likely to transform the ecology an employee's learning and development (Removed for double-blind review). Adaptive expertise practices are critical for extending competencies in response to partially unforeseen professional challenges and situations that emerge in rapidly transforming working environments. To conclude, the concept of adaptive expertise is used in this study to refer to a professional's personal efforts aimed at deliberately improving his or her professional competence, seeking

alternative solutions for existing professional practices and becoming an active knowledge-building and networking actor in his or her professional field in order to reach the highest levels of professional competence.

Research Aims

This study examines the procedure with two advisors which aims to support the continuing professional learning and development of professionals working in emerging fields by interconnecting academic and workplace settings. The study was carried out in the context of a yearlong energy efficiency training programme. The following research questions are addressed:

1) Does a course participant's orientation to adaptive expertise predict the success of the guidance process, and if so, how?
2) How does the interconnection of workplace and academic knowledge and practices occur through guidance?
3) What are the features underlying the most successful guidance relationships at the personal, dyad and context levels?
    3.1) Do academic guidance and workplace guidance differ regarding these features, and if they do, in what way?

Method

Energy Efficiency Training Programme

The study was carried out in the context of a yearlong Academic Apprenticeship Education programme in the field of energy efficiency in Finland in 2011 (Removed for double-blind review). The energy efficiency training was a pilot education programme organised for the first time. It aimed at supporting the cultivation of course participants' energy efficiency expertise and thus enabling them to deliver energy efficiency knowledge to their workplaces, promoting professional networking and the sharing of good practices between actors working in the field. The target group consisted of professionals already working with energy efficiency issues in the private and public sectors. The course participants were engineers, architects and other professionals with a master- or bachelor-level education and varied lengths of professional experience. The training was organised in collaboration with three technical universities. Two of the universities organised education for actors working in the

public sector (University A, n = 29; University B, n = 28) while one focused on actors working in the private sector (University C, n = 30).

The energy efficiency training included theoretical studies, self-study and workplace learning. Theoretical studies were organised as seven contact days involving lectures, small group work and discussions (Removed for double-blind review). An essential part of the training was a study project which the participants completed at their workplaces during the training. The study projects aimed at supporting participants' professional learning and verifying that learning was taking place during the training. The projects were realised through the development of organisations' energy-efficient operational practices by bridging theoretical and practical aspects of energy efficiency and the course participants' working assignments. The workplaces were expected to provide resources for the course participants to pursue the study project during working hours. The participants assembled portfolios and posters regarding their study projects, which were presented to the other course participants at the end of the course. After the pilot education programme, the energy efficiency training has been organised in different lengths and forms, mainly as short term educational courses.

Academic and workplace guidance

The course participants were provided with professional guidance in academic and workplace settings to enable them to complete the study project and to support learning. Each participant was assigned an academic advisor on behalf of the organising universities as well as a workplace advisor from his or her workplace organisation. The role of the academic advisors was to support participants in their study projects by providing scientific knowledge, discussions and information about valuable source books. The advisors had expertise in energy efficiency and experience both in research and teaching, either in universities or private companies. Each participant was entitled to 20 hours of personal guidance from the academic advisors during the training.

The workplace advisors, in turn, were expected to support the course participants in their workplace learning processes, to promote their professional development in the context of the participants' individual assignments and to guide the preparation of the study projects from the perspective of the organisational goals. In the beginning of the training, each participant created a personal developmental plan, including learning goals and a strategy for realising them, together with his or her workplace advisor and a representative of the organising university. In most cases, the workplace advisors were course participants' superiors. They did not necessarily possess strong knowledge related to energy efficiency. In

some cases, a colleague who was interested in energy efficiency issues acted as a workplace advisor. The participants and workplace advisors were advised to meet monthly.

The interconnection of the academic and workplace settings was, for the most part, meant to take place through the guidance practices, that is, interaction, collaboration and shared discourse between the academic and workplace advisors in steering the course participants to conduct the study projects. The topics of the study projects were aimed to bring the participants together with both of their advisors. In addition, both the workplace advisors and the academic expert advisors evaluated the study projects at the end of the training.

Participants

The participants of the study included 18 course participants as well as eight of their academic expert advisors and eight workplace advisors. Participation was voluntary. Four of the course participants came from University A (participants A2–A26), six from University B (participants B2–B22) and eight from University C (participants C1–C23). Consequently, nine course participants worked in the public sector while seven worked in the private sector. The course participants represented different age groups and had different educational backgrounds. In addition, they had different levels of experience related to energy efficiency in terms of their job descriptions. The summary of the course participants' backgrounds is presented in Table 1.

Insert Table 1 about here

Table 2 provides background information for the advisors. One of the interviewed academic advisors operated in University A, three operated in University B and four operated in University C. The number of their advisees varied from one to eleven. All interviewed academic advisors had strong expertise in energy efficiency and issues related to energy efficiency had an essential role in their job descriptions. Two of the interviewed workplace advisors provided guidance for participants from University A, two provided guidance for participants from University B and four provided guidance for participants from University C. Most of the workplace advisors had only one advisee, but if several course participants took part in the training from the same organisation, one workplace advisor could have several advisees. There were only three workplace advisors whose work assignments were

related to energy efficiency and who had previous experience in issues related to energy efficiency.

Insert Table 2 about here

Semi-Structured Interviews

Semi-structured interviews were conducted twice with the participants. The pre-interviews (n = 16) were conducted at the beginning of the training and the post-interviews (n = 18) were conducted at the end of it. The pre-interviews addressed course participants' 1) educational backgrounds, work experience, current work assignments and professional role in relation to energy efficiency; 2) targets of development regarding energy efficiency issues; 3) reasons for gravitating to the energy efficiency training; 4) experiences of academic and workplace guidance; 5) networking with the other course participants and 6) future prospects of developing energy efficiency expertise. The length of the pre-interviews varied from 25 to 79 minutes. The post-interviews addressed 1) course participants' experiences during the energy efficiency training; 2) actual realisation and methods of workplace learning and academic and workplace guidance; 3) networking with the other course participants and 4) the future prospects of developing energy efficiency expertise. The post-interviews lasted from 20 to 48 minutes.

The semi-structured interviews with the eight willing academic advisors (indicated with codes AA3–AA36) and eight workplace advisors (indicated with codes WA1–WA8) of the interviewed course participants were carried out after the training. Overall, 50 interviews were conducted within the framework of this study. The interviews with the advisors addressed 1) their current work assignments, professional roles and know-how related to energy efficiency; 2) their previous experience in working as advisors and 3) their perceptions of the realisation, contents and used methods of guidance. In addition, they were asked 4) whether there existed any obstacles for guidance and 5) suggestions for how guidance could be developed in the future. Furthermore, the workplace advisors were asked to assess 6) what kinds of benefits participation in the energy efficiency training might bring to their workplace organisations.

Analysis of the Data

The interviews were audio recorded and transcribed. The data were analysed according to qualitative content analysis using the ATLAS.ti program. The interviews were examined from two perspectives: 1) guidance process and 2) course participants' orientation to adaptive

expertise. The codes reflecting the guidance process were interconnection of academic and workplace guidance and success of guidance process. Further, the codes reflecting orientation to adaptive expertise were the intensity of deliberate practice, problematisation of professional practices and efforts to build professional knowledge (knowledge building). These codes were used to categorise expressions that were searched from the interviews. The categorisation of the interviews in relation to the guidance process and orientation to adaptive expertise is explained below and a more detailed description is presented in Appendix 1.

The codes 'interconnection of academic and workplace guidance' and 'success of guidance process' were only used for analysing the participants' post-interviews because the role of the advisors was not yet significant at the time of the pre-interviews. The codes reflecting orientation to adaptive expertise were used for analysing the course participants' pre- and post-interviews. Mainly, the analysis was based on the pre-interviews, but the post-interviews were used to complete the contents. It should be noted that these categories characterising the provision of guidance are perceptions of the course participants and are therefore not direct properties of guidance.

By relying on the contents extracted from the interviews, the first and second co-authors independently evaluated and then quantified the aspects of deliberate practice, problematising and knowledge building by giving each participant a score on a 3-point rating scale (1 = low score; 2 = medium score; 3 = high score). Similarly, for each participant, the success of the guidance process in academic and workplace contexts as well as the interconnection of academic and workplace guidance were evaluated and quantified on a 3-point rating scale. The scoring criteria for each aspect are described in Appendix 1.

An inter-rater reliability analysis using the Kappa statistic was performed to determine the consistency among raters regarding the five aspects (see Table 3). The agreement between the raters varied from moderate to perfect.

Insert Table 3 about here

To answer the first research question, Spearman's correlation coefficients were computed to explore correlations between the scores representing the participants' level of adaptive expertise and the success of the guidance processes in academic and workplace settings. In addition, the analysis was enriched qualitatively by seeking explanations for the correlations from the course participants' pre- and post-interviews. This was done by the first co-author.

To answer the second research question, the interconnection of academic and workplace settings was examined by relying on the ratings explained above. In addition, the analysis was enriched by a qualitative analysis. The first co-author sought interpretative contents from the course participants' post-interviews concerning the reasons for unsuccessful interconnection of academic and workplace settings, possible benefits of interconnection as well as other mentions of fusing theory and practice within the framework of the energy efficiency training that were not related to the guidance practices.

To answer the third research question, the analysis was conducted at the case level by focusing on those course participants (n = 5) whose guidance relationship with the academic advisor or workplace advisor was successful. The cases were selected on the basis of the highest rates (score 3) of success in academic and workplace guidance. The analysis relied on the course participants' post-interviews and the advisors' interviews. The first co-author identified contents describing the features underlying a successful guidance relationship in the academic and workplace contexts. These contents were categorised as personal, dyad-level and contextual features. Personal features refer to the course participant's or advisor's individual characteristics, dyad-level features were related to the interaction between the course participant and the advisor and contextual features were related to certain environments and were not characteristics of the course participant or the advisor. The categorisations were confirmed by the second co-author.

Results

Orientation to Adaptive Expertise and the Success of a Guidance Process

The first aim of this study was to examine whether a course participant's orientation towards adaptive expertise predicts the success of a guidance process. To answer this question, relying on the contents extracted from the interviews, we first evaluated the success of each participant's guidance process as well as the level of each participant's orientation to adaptive expertise on a scale from 1–3. Regarding the success of the guidance process, 1 indicates that the guidance relationship did not function at all, 2 indicates that it functioned moderately and 3 indicates that it succeeded well. Regarding the orientation to adaptive expertise, 1 stands for minor efforts, 2 for some efforts and 3 for strong efforts aimed at deliberate practice, problematising or knowledge building. The ratings are presented in Table 4. The evaluations of the success of the academic and workplace guidance are based on the post-interviews of the course participants and therefore only represent their experiences. The table reveals that

there was only one course participant (C1) whose guidance relationship with both advisors succeeded excellently (score 3). In addition, two course participants had successful guidance relationships with their academic expert advisors (A20 and C17) and two had successful guidance relationships with their workplace advisors (B2 and C20). On the other hand, there were two course participants (A8 and A26) whose guidance relationships with both advisors did not function at all (score 1). In the other cases, the guidance relationships functioned moderately (score 2) with at least one of the other advisor. Similarly, in regard to orientation to adaptive expertise, each participant was rated according to the depth of his or her efforts aimed at deliberate practice, problematising and knowledge building. Two course participants (A20 and C17) expressed strong efforts (score 3), while another two (A2 and C20) expressed low efforts (score 1) in terms of expertise orientation for all three attributes. In the other cases, the ratings varied.

Insert Table 4 about here

Second, we calculated a Spearman's correlation coefficient to examine whether there was a connection between the ratings indicating the success of the guidance relationships and the course participants' orientation to adaptive expertise. The correlation analysis revealed that there was a high positive correlation between the success of academic guidance and deliberate practice ($r = .626$; $p = .007$), problematising ($r = .562$; $p = .023$) and knowledge building ($r = .615$; $p = .011$). No significant correlations were found between the three attributes of orientation to adaptive expertise and the success of workplace guidance.

This indicates that the course participants' personal efforts aimed at deliberately acquiring knowledge and improving their professional competence, seeking alternative solutions for existing energy efficiency practices and becoming active knowledge-building actors in the energy efficiency field facilitated the guidance relationships with the academic advisors. The interviews that were examined for explanations for the correlations revealed that the course participants with a strong orientation towards adaptive expertise valued the resources (e.g. knowledge, competencies and novel perspectives) that they were able to obtain through the academic advisors more than the participants with a lower orientation to adaptive expertise. Therefore, they invested more effort in the guidance relationships. Interactions with the academic advisors were seen as a fruitful way of acquiring useful knowledge and developing overall professional expertise. For example, with the help of the academic advisor, C17 aimed at 'creating learning so that you could develop new

competences that could be utilised in the actual product development'. Many of the course participants with a lower orientation to adaptive expertise did not find the competencies represented by the academic advisors or the possibility of gaining access to new information through the advisors to be valuable. Instead, they were more willing to rely on pre-existing knowledge in their own workplace organisations: 'So I did not actually use the academic advisor, because knowledge mostly came from different people from this company' (C4). Some of the course participants did not even recognise how the guidance provided by the academic advisors could be capitalised on: 'Maybe I wasn't able to ask for help [from the academic advisor], but I didn't know that I needed assistance' (C20).

Interconnection of Academic and Workplace Guidance

To answer the second research question, we relied on the post-interviews of the course participants and the interviews of the academic and workplace advisors. We examined to what extent and through what kinds of practices the interconnection of the academic and workplace settings was embedded as a part of the guidance process; that is, how the two advisors, through collaboration and complementing each other's competences, steered the course participants' completion of the study projects, and to what extent they had a shared discourse regarding guiding the study project. However, the interviews revealed that the academic and workplace contexts did not really become interwoven through the guidance practices in any of the cases of the interviewed course participants. Even in cases where the guidance succeeded well or moderately with both advisors, the two settings remained separate. There was no interaction between the advisors. The ideal procedure and the realisation of the interconnection of guidance are presented in Figure 1.

The interviews revealed that the successful interconnection of guidance in the academic and working life contexts would have required contributions from both the advisors and the course participants. It was obvious that there was no possibility for interconnection if one of the two advisors or the course participants were not dedicated to guidance: 'I have an assistant here [the workplace advisor], who certainly knows and can handle these issues but said that he does not have time for this kind of [activity]' (A8). The most important reasons for the failure of interconnection appeared to be the limited resources provided for organising the guidance as well as the organising practices of the training design that did not support the realisation of academic and workplace guidance. Many of the academic and workplace advisors indicated that they had not been informed about the practices of the guidance given

in the other setting or of the general contents of the training. In addition, there were no common meetings in which the course of action could have been agreed upon together:

> Some sort of advisors joint session could be in order, so that you could hear… get a bit of perspective on what others are doing and what their goals are, because this would in a way create your expectation value regarding the training (WA5).

Many of the course participants also mentioned that they would have benefitted more from the guidance if there had been interaction between the academic and workplace advisors. For example, common meetings would have helped in utilising and combining the different kinds of information provided by the advisors. The participants found it somewhat confusing that the two advisors often had not joined understandings regarding the learning goals and the purposes of the study project; that is, whether the emphasis should be on theoretical and academic issues or if the study project should be more practical in nature: 'Here are some sort of academic goals—and now when the workplace advisor sees these things from the perspective of her own practical work, we're at cross purposes' (C9).

Insert Figure 1 about here

Even though interconnection did not take place as part of concrete guidance practices, there were several other mentions of fusing theory and practice. Clearly, having two advisors representing academic and working life competencies and different perspectives (i.e. theoretical and practical) on energy efficiency provided the participants with divergent assistance for pursuing the study project and, at best, extended their understanding of issues related to energy efficiency: 'This academic advisor from the university side provided such proper expert knowledge of the energy sector and then the workplace advisor was able to reflect on how it affects our main actual everyday work' (A2). Many of the course participants were independently able to connect theoretical aspects of their practical work tasks and find ways to transition between the two contexts:

> I have participated this year also, among other things, in such an internal working group of our city that has focused on city-level energy efficiency issues. It has been very beneficial to consider these issues simultaneously in two groups and has produced some sort of confidence for talking about it—understanding terms used by different administrative bodies, including those people who work in the field of energy efficiency (B21).

Useful knowledge was received not necessarily from the advisors but, for example, through the lectures or by independently seeking references: 'The face-to-face meeting days fortunately brought like a broader perspective' (B6). Some participants' overall understanding of the energy efficiency field improved substantially: 'I have been able to better see how energy efficiency issues should be considered in my own work' (A2). In some cases, theory and practice were interconnected by passing the knowledge received from the training on to colleagues and customers as well as by developing and implementing practical tools for organisational use: 'Everything that has been experienced here has been always taken forward and beyond, not just with workmates, but whenever there are customers and I give training lectures, I am able to put these issues forward' (C8).

The Features Underlying a Successful Guidance Relationship

The results above indicated that even though the interconnection of academic and workplace settings was not embedded as a part of the guidance practices, the guidance relationship could be successful with both or either one of the advisors. The third aim of the study was to examine what features were behind the successful guidance relationships in regard to academic and workplace settings. The analysis was conducted at the case level by focusing on those five course participants according to whose experience the guidance relationships with both advisors were successful (C1), or where the relationships were successful with either the academic advisor (A20 and C17) or the workplace advisor (B2 and C20) (i.e. the success of their guidance relationships achieved a score of 3) (see Table 4). The analysis relied on the post-interviews of the particular course participants and their advisors' (AA36, WA4, WA5 and WA6) interviews. There were two features that were common for successful academic and workplace guidance, though several distinct features were found in academic and workplace settings (see Figure 2).

Common features of academic and workplace guidance

1. Dedicated advisor. In both academic and workplace settings, successful guidance required that the advisor was committed to his or her role as an advisor and dedicated to organising meetings, commenting on the study project and giving advice. In all cases, the advisors were truly interested in the study projects of the course participant: 'He himself did research on the topic; you can clearly notice that it was not only a follow-up meeting because you had to, but he was also on the listening side and wanted to see how it works' (C1).

2. Dedicated course participant. In addition to a dedicated advisor, the success of the guidance process required the course participant's commitment. The interviews revealed that A20, C1 and C17 valued the possibility of gaining access to new information through their academic advisors and desired to utilise the knowledge and expertise they provided. Participants B2, C20 and C1 also actively sought the advice of their workplace advisors. For example, a workplace advisor described C20 to be 'very active, he said that could he reserve a follow up meeting for each month, which was in my opinion very good. … In that way the supervision and this task stayed constantly relevant' (WA6).

Insert Figure 2 about here

Features underlying successful academic guidance

The features underlying successful academic guidance are divided into personal, dyad-level and contextual features. Personal features refer to the course participants' or advisors' individual characteristics that positively affected the success of the guidance relationships. Dyad-level features are related to the interaction between the course participant and the advisors. Contextual features, on the other hand, are related to certain environments and are not characteristics of the course participants or the advisors. However, before presenting these results, the circumstances surrounding unsuccessful academic guidance are summarised briefly by relying on the interviews of those course participants whose guidance relationship with their academic advisor did not function at all (see Table 4). One explanation for unsuccessful guidance was that the course participants did not see the relevance of the knowledge provided by the academic advisor (C4 and C20) or the expertise of the advisor did not meet the need of the course participant (B21). In one case, the course participant was dissatisfied with the track record of the appointed advisor (A26), and in another case, the advisor was not committed to his role and therefore was unavailable (A8). According to the interviewed academic advisors of these course participants, the main reason for unsuccessful guidance was that the course participants did not contact the advisor (AA27 and AA32) or that they had low orientation to scientific questions (AA27).

Personal features

1. Strong orientation to adaptive expertise refers to purposeful efforts aimed at expanding professional competence through deliberate practice, problematising the existing practices in the field of energy efficiency and being an active knowledge-building actor.

These efforts were characterised by A20, C1 and C17, who were oriented towards actively developing expertise by taking part in versatile professional education, seeking new professional challenges and taking advantage of all kinds of opportunities to obtain access to new knowledge. Instead of sticking to old routines, they emphasised the importance of actively keeping up with the newest knowledge and professional practices as well as anticipating the competencies that would be needed in the future, including 'New knowledge and vision concerning where we are going and what to prepare for in the future' (A20). According to A20, C1 and C17, self-motivated efforts aimed at acquiring multidisciplinary knowledge and the most up-to-date knowledge of the leading techniques and best practices are necessary to reach the leading edge of the energy efficiency domain: 'Knowledge about technological development like this doesn't come on the road. There you may get the experience but the newest technology isn't there. It has to be adopted and actively searched for and requested' (C1). In addition, both A20 and C17 emphasised that in order to promote the development of the whole domain, a more open communication culture is needed among the actors working in the field:

> If the aim is that even such difficult issues should be solved, those can only be solved by getting some assistance and examples so that we also discuss those areas where we haven't succeeded and give advice on how not to do it that way and how it would be better to try something else' (A20).

Dyad-level features

2. The advisors' fields of expertise fit the themes of the study projects for A20, C1 and C17: 'It fit in perfectly so that her background fit with this development project of mine' (C1). Therefore, the advisors were able to provide specialised assistance and advice regarding the contents of the study project, which was seen as the most valuable aspect of the guidance: 'If this student has a special area of expertise, then he would also be guided towards an expert who is specialised in the area. So in that case, it would be more meaningful' (AA36).

3. Clear aims for the guidance were set. In the cases of C1 and C17, the aims for the guidance were outlined on the basis of their personal learning goals together with the academic advisors. These aims steered the whole guidance process and were thus an important condition for successful guidance: 'Everybody has had very individual starting points and goals, and the content of the guidance has been determined on the basis of these starting points and goals' (AA36).

4. Previous collaboration between the advisor and the course participant. A20 and C17 knew their academic advisors prior to the training because of previous professional collaboration. Therefore, they knew the advisors' fields of expertise as well as their methods of working and asked them to become their academic advisors. Obviously, having versatile professional contacts helped A20 and C17 to have apposite advisors.

Contextual features

5. Regular face-to-face meetings and systematic guidance created a basis for a successful relationship between the academic advisors and the course participants. In the cases of A20, C1 and C17, regular face-to-face meetings from the beginning of the training required the course participants to pursue the study projects systematically and the advisors to comment on them on a regular basis:

> I think that guidance serves the student mostly so that there is a certain deadline for reporting to an external person. You report in your own words and face to face about what has happened; what has been done; why and how you feel now and how to continue. So, of course, that feeling of advancement is created only through having, so to speak, an opportunity to present and get feedback (AA36).

The meetings were organised monthly, and timetables for the meetings were arranged beforehand. Both the course participants and the advisors were responsible for the realisation of guidance meetings: 'Being deliberate and planning the meetings as well would set a rhythm for activity so that it [the developmental project] would be forced to completion' (C1). In many cases, the geographical distance between the advisors and course participants was too great for organising one-to-one meetings. Where possible, meeting face to face enabled closer interaction between the course participants and the academic advisors and thus created better frames for learning.

Features underlying successful workplace guidance

Before discussing the features underlying successful workplace guidance, the features underlying unsuccessful workplace guidance are summed up briefly by relying on the interviews of those course participants whose guidance relationship with their workplace advisor did not function at all (see Table 4). In some cases (B22, C8 and C17), the course participant had the most advanced expertise in energy efficiency issues in his or her workplace organisation and therefore the workplace guidance was experienced as being fruitless. In addition, having a rushed or unmotivated workplace advisor (A8, A26) or having

undefined aims for guidance (C17) prevented the success of the workplace guidance. According to the interviewed workplace advisors of these course participants, unsuccessful workplace guidance was due to lack of time (WA2) or matching expertise (WA8). One advisor (WA7) felt that the trainees were not sufficiently interested in practical matters that are especially relevant in the workplace. The features underlying successful workplace guidance are discussed more closely in the following subsection by dividing them into personal, dyad-level and contextual features.

Personal features

1. The advisors were interested in supporting the professional development of their subordinates, especially in the cases of C1 (WA5) and C20 (WA6): 'I'm very interested in all kind of developmental work and especially in the professional development of personnel' (WA6). The advisors, for example, encouraged C1 and C20 to participate in the energy efficiency training. These workplace advisors acknowledged that participation in the training would benefit not only the participants but also the whole organisation. During the training, WA6 supported the course participants' learning by providing guidance regarding the study projects and reorganising the working tasks:

> I've tried to give all tasks and projects related to energy efficiency and stuff to these two people. … And then I have, of course, looked after them, seen how well they have performed the task and tried to provide them assistance and evaluated the end result (WA6).

This kind of personal interest in the professional development of the course participants clearly strengthened the advisors' commitment to the guidance process and their role as advisors.

2. The advisors had strong expertise. Furthermore, an important feature affecting the success of the workplace guidance of B2, C1 and C20 was the fact that their workplace advisors had strong expertise either in the field of energy efficiency (WA5, WA6) or extensive professional experience in their own domains (WA4). The experienced workplace advisors were able to connect energy efficiency aspects to an organisational perspective and apply both to the study project: 'I bring to this work the views and rhythms of the overall company. Due to our company's aim and because of those kinds of considerations, it has been, in my opinion, a good arrangement' (WA5).

Dyad-level features

3. Guidance occurred as a part of daily practices. B2, C1 and C20 emphasised that the workplace guidance they received followed their normal interaction routines as a natural part of work practices: 'It hasn't necessarily been talked about using the term "guidance"' (C1). Discussions regarding the study projects took place in between the daily routines at work whenever needed: 'Very little of it was sort of official, us sitting together and reflecting on this developmental project of mine; rather it was like when either one of us had some issues to communicate, then we went over it. As a result, we talked a lot' (B2).

4. Close interaction between the course participant and the advisor. It seemed that the daily interactions between B2, C1 and C20 and their workplace advisors were close and straightforward. This created a stable basis for guidance: 'When people work this closely together, then the personal relations, of course, improve and you can guide and develop them further' (WA6).

5. Advisor as an interlocutor. The role of B2's, C1's and C20's workplace advisors was to act more as interlocutors rather than providing direct instructions for pursuing the study projects. The advisors guided the course participants through discussions regarding the aims and realisation of the study projects and also helped them to face problems, but the main responsibility for designing and carrying out the projects rested with the course participants.

Contextual features

6. The advisor was an immediate superior. The workplace advisors were immediate superiors of B2, C1 and C20 and worked closely with them. This helped in organising the meetings and deciding on the contents of guidance:

> My workplace advisor is my closest supervisor and often works at the next office. Therefore, we have discussions on a day-to day basis and thus I can learn as much as needed. And sometimes he came to advise me on his own initiative (C20).

7. The study projects were closely related to the work tasks of C1, B2 and C20. This enabled effective time management in regard to learning and working during the training: 'The purpose was such that it probably would just go to implementation, meaning that you could study at the same time as building and planning' (C20). In addition, in these cases, the study projects provided direct benefits to the organisations as well: 'We pretty carefully examined the goal setting and how it [the study project] can be incorporated in the timetable of the course and those intermediate milestones and how those milestones could be related to our own energy efficiency program' (WA5).

Discussion

Even though becoming a professional is acknowledged to be a process of fusing theoretical and practical aspects of professional knowledge (Bromme and Tillema 1995), these two components have traditionally been separated in educational and working life practices. However, in the face of the new kinds of professional challenges that the changes in working life cause for workers, new forms of cooperation are required between higher education institutions and workplaces (e.g. Billett and Henderson 2011). In this study, we examined a new training design for continuing professional development that aimed to support the learning of the new knowledge and skills needed in the emerging professional field of energy efficiency by interconnecting academic and workplace settings. The training design rested on using two advisors, one from working life and the other from an academic context. We analysed how trainees' orientation to adaptive expertise predicts the successful guidance process, whether the interconnection of the academic and workplace settings occurs through guidance practices and the features underlying successful guidance processes.

It is acknowledged that trainees' deliberate orientation towards and investments in learning play an important role in the development of expertise (Bereiter and Scardamalia 1993; Ericsson 2006). The results of this study suggested that learners' personal efforts aimed at deliberately acquiring knowledge and improving professional competence, seeking alternative and novel solutions for existing professional practices and efforts to become active knowledge-building actors in their professional fields were features that were related to the success of the guidance process in the academic context. The results suggested that strong personal orientation towards adaptive expertise indicates the willingness and capability to see the relevance of participating in versatile learning activities aimed at increasing professional knowledge, which is important to the quality of the learning process (see van Zolingen, Streumer, de Jong and van der Klink 2000). In addition to a willingness to intentionally develop oneself, it is also essential to relationally understand how the expertise of others can be utilised; that is, not just acquiring knowledge but deliberately initiating joint activity and collaboration (Edwards 2010; see also Removed for double-blind review). It might be that agentic trainees with a strong orientation towards adaptive expertise are able to engage advisors strongly in the guidance processes and, through their relational efforts, get the most out of the guidance relationships. It should be noted here, however, that even though the results indicate the importance of strong adaptive expertise efforts in preparing for and coping with demanding, multifaceted and partially unforeseen professional challenges, it is

hard to evaluate the participants' actual level of adaptive expertise, especially when relying solely on interview data. In this study, these features were only observed in a small group of participants.

Combining learning between academic and professional organizations would be extremely important in emerging fields in which the workers are required to continuously deepen their expertise and where professional growth relies on informal learning rather than on an already established strong knowledge base or traditional academic training (Removed for double-blind review). Successful interconnection of academic and practical settings in guidance practices could provide a fruitful basis for developing a novel kind of expertise, cutting-edge competencies and new working tools and innovations (see Billett and Henderson 2011; Tynjälä, Välimaa and Sarja 2003). However, earlier studies conducted in the higher education context have revealed that combining learning between educational institutions and workplaces does not take place easily. In many cases, the supervision of the students has remained completely separated from the workplace activities (Endedijk and Bronkhorst 2014; Poortman, Reenalda, Nijhof, Loek and Nieuwenhuis 2014). The results of this study also indicated that the actual and concrete interconnection of academic and workplace settings through guidance practices (e.g. through the collaboration of the two advisors) is challenging.

It is obvious that the practical needs of workplaces and the scientific viewpoints and standards of the academic world do not necessarily meet when trying to find new forms of cooperation between higher education and working life. Tensions are likely to reflect the fundamental differences between the different knowledge cultures and environments and can arise between disparate goals and priorities (Billett 2008; Knorr Cetina 2001; Edwards 2012; Nerland 2012). This study showed that, specifically, the distinct working cultures of academic and working life complicated the interconnection of guidance. If common understandings and interests regarding the study projects and the learning goals of the course participants were not found, there existed no foundation on which to develop collaboration. Obviously, interconnecting learning in the context of universities and working life requires deeper negotiations for reaching agreements on common practices and finding shared aims for learning (see Collin and Tynjälä 2003). In addition, strong efforts from organising institutions are needed. As the results indicated, the main reason for the separation of academic and workplace guidance appeared to be that the practices of organising the programme did not support the interconnection of academic and workplace guidance. It needs to be noted here that the guidance processes were strongly dependent on the resources that were given to carry out the training programme.

However, it should be acknowledged that, as the experiences of many course participants indicated, interconnection of academic and workplace settings through actual social interaction between the advisors was not a necessary prerequisite for circulating and exchanging knowledge across different environments and cultures or at least on an individual's mind. The results indicated that having two advisors representing different kinds of professional perspectives helped the course participants to find ways of connecting theoretical aspects to their practical work tasks. It can be assumed that this kind of participants' own integrative activity is particularly characteristic in emerging fields in which there are no adequate professional practices or experienced experts in workplaces nor established teaching programmes in educational institutions.

The results showed that in emerging fields, successful professional guidance is a complicated process that is affected by the features of the learner, the advisor and their interaction as well as the features of the learning environment and the nature of knowledge. Overall, it seems that the basis for a successful guidance process, that is regular meetings, an accessible, helpful and dedicated advisor, a committed trainee and clear aims set for guidance, is similar in emerging fields to that found in any other fields (see Boud and Costley 2007; Barnes, Williams and Archer 2010; Vanthournout, Noyens, Gijbels and Van den Bossche 2014). However, these features alone seem to not be enough in emerging fields in which the professional knowledge is complex, multidisciplinary and, at the same time, very specialised. For example, energy efficiency is a challenging professional domain that constantly generates new questions and becomes infinitely more complex when approached (Knorr Cetina, 2001). Consequently, there are no readymade and clear-cut operational resolutions and sustained efforts of working out contextually relevant workable solutions are needed. Therefore, an excellent match between the expert profiles of the learner and the advisor is especially critical for successful guidance. The match between the trainees' needs and the advisors' special fields of expertise seems to be eminently important if the field is scattered, there are not necessarily many actors in the field and the knowledge of where these actors are located is not always achievable, as is the case in the field of energy efficiency.

Prior studies have pointed out that people demonstrating exceptional achievement have almost always learned under the supervision of master advisors (Sosniak 2006). In a specialised and fragmented field, such as energy efficiency, it is not always easy to match advisees' and advisors' expert profiles, i.e. to find the right people who are sufficiently skilled (see Eraut 2007). This is especially the case in the workplace contexts in which the participant is often the most knowledgeable person. The workplaces may not necessarily be

able to provide leading edge and specialised field-specific knowledge and possibilities for learning complex competencies or, more importantly, to create a supportive environment for learning by providing resources, discussions and support for the participant (see Evans, Hodkinson, Rainbird and Unwin 2006; Margaryan, Milligan and Littlejohn 2013). In general, few workplaces are prepared to organise demanding and target-oriented workplace learning; rather, they are often inclined to favour learning routines. In this study, the workplace advisors, at best, enabled professional learning for applying scientific knowledge received from universities. Therefore, successful guidance was related especially to fluent interaction between the advisor and the trainee.

To conclude, the procedure using two advisors seems to be a valuable method for preparing workers to meet the new requirements of a changing world and their future working lives, especially in emerging fields. However, it requires that, in addition to sufficient resources for organising guidance, different aspects of successful guidance processes click into place—above all, the right people must be found and the trainees themselves must be oriented to utilise the novel resources provided to them. Moreover, there must be readiness in the workplaces to organise qualified guidance or at least the willingness to support the trainee's efforts of applying the theoretical knowledge provided by the universities to the working practices. Altogether, readiness to overcome and negotiate the boundaries of different knowledge and working environments and cultures being incommensurate in nature is needed from all parties (see Nerland 2012).

Although the present investigation relied on extensive interview data, we only studied one professional training course, interviewed only a limited number of participants and assessed the nature of their expertise by relying merely on the participants' self-reports. More research is needed to generalise the results. In addition, we did not reach all the advisors of the interviewed course participants for interviews. Therefore, the information regarding the success of the guidance processes and the interconnection of academic and workplace settings was based solely on the experiences of the course participants.

This study provides several educational contributions regarding organising professional guidance in both academic and practice settings. In particular, the results highlight the importance of finding the right, competent and dedicated advisors. Finding well-matched trainees and advisors might also ensure regular and goal-oriented advisory practices that become a natural part of daily practice instead of remaining just external actions or inert knowledge. If this kind of situation is achieved, the hierarchical relationship between advisors and learners that is characteristic of many expert networks and workplaces will transform into

an interlocutor relationship between two experts. Because expertise studies have revealed that advisors play a crucial role in professional learning, future studies should examine the mechanisms through which the right people find each other and start collaborating. In addition, even though the difficulty of finding shared practices and interests between academic and workplace contexts is an old problem, it seems that future research could help to overcome obstacles to interconnecting guidance taking place in these two settings by aiming to find successful examples of bringing these contexts closer to each other instead of just identifying the problems and complications.

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Table 1

Course Participants' Backgrounds

Code	Gender	Age	Education	Working sector	AA	WA	Job description in relation to energy efficiency
A2	Male	35–39	Architect	Public	AA3	WA1	In the background
A8	Male	55–59	Engineer	Public	-	WA2	In the background
A20	Female	35–36	Engineer	Public	-	-	A central part of job description
A26	Female	55–59	Architect	Public	-	-	In the background
B2	Female	40–44	Engineer	Private	AA25	WA4	In the background
B6	Female	40–44	Architect	Public	AA21	WA3	In the background
B7	Female	45–49	Engineer	Public	-	-	In the background
B16	Female	25–29	Engineer	Public	AA21	-	A central part of job description
B21	Male	30–34	M.Sc.	Public	-	-	About half of job description
B22	Male	35–39	Engineer	Private	AA24	-	A central part of job description
C1	Male	-	Engineer	Private	AA36	WA5	A central part of job description
C4	Male	40–44	Engineer	Private	AA27	-	In the background
C8	Male	40–44	Engineer	Private	AA31	WA8	A central part of job description
C9	Male	50–54	Engineer	Private	AA36	WA6	In the background
C17	Male	25–29	Engineer	Private	AA36	WA7	A central part of job description
C20	Male	30–34	Engineer	Private	AA32	WA6	In the background
C21	Male	55–59	Engineer	Private	-	-	In the background
C23	Female	30–34	M.Sc.	Private	-	-	A central part of job description

[a] AA = the code of the course participant's academic advisor

[b] WA = the code of the course participant's workplace advisor

[c] - indicates information missing

Table 2

Academic Expert Advisors' and Workplace Advisors' Backgrounds

Code	Gender	Age	Education	Working sector	Number of course participants	Job description in relation to energy efficiency
AA3	Female	25–29	Architect	Higher Ed.	2	A central part of job description
AA21	Male	40–44	D.Sc. (Tech.)	Higher Ed.	11	A central part of job description
AA24	Male	30–34	D.Sc. (Tech.)	Higher Ed.	4	A central part of job description
AA25	Male	35–39	D.Sc. (Tech.)	Higher Ed.	3	A central part of job description
AA27	Male	45–49	D.Sc. (Tech.)	Higher Ed.	3	A central part of job description
AA31	Male	35–39	Ph.D.	Higher Ed.	1	A central part of job description
AA32	Female	40–44	M.Sc. (Tech.)	Higher Ed.	3	About half of job description
AA36	Female	35–39	Lic.Sc. (Tech.)	Higher Ed.	4	A central part of job description
WA1	Female	-	-	Public	1	In the background
WA2	Male	-	-	Public	1	In the background
WA3	Male	-	-	Public	1	In the background
WA4	Male	-	-	Private	1	In the background
WA5	Female	-	-	Private	1	A central part of job description
WA6	Female	-	-	Private	2	In the background
WA7	Male	-	-	Private	3	About half of job description
WA8	Male	-	-	Private	2	A central part of job description

[a] AA = academic advisor

[b] WA = workplace advisor

[c] - indicates information missing

Table 3

Inter-rater Reliability: Cohen's Kappa Measurements

Themes	Cohen's kappa	Percentage agreement
Interconnection of guidance	-	100%
Success of academic guidance	$\kappa = .904$	94%
Success of workplace guidance	$\kappa = .723$	83%
Deliberate practice	$\kappa = .829$	89%
Problematising	$\kappa = .595$	75%
Knowledge building	$\kappa = .791$	88%

Table 4. Overview of the scores for the attributes of guidance process and orientation to adaptive expertise

Code	Success of guidance relationship[1]		Orientation to adaptive expertise		
	Academic guidance	Workplace guidance	Deliberate practice	Problematising	Knowledge building
A2	2	2	1	1	1
A8	1	1	1	1	-
A20	**3**	**2**	**3**	**3**	**3**
A26	1	1	2	1	2
B2	**2**	**3**	**1**	**2**	**2**
B6	2	2	1	2	1
B7	2	2	2	1	1
B16	2	2	2	1	1
B21	1	2	2	1	1
B22	2	1	2	3	1
C1	**3**	**3**	**3**	**2**	**2**
C4	1	2	1	2	1
C8	2	1	3	1	2
C9	2	2	1	1	2
C17	**3**	**1**	**3**	**3**	**3**
C20	**1**	**3**	**1**	**1**	**1**
C21	2	2	2	1	1
C23	-	2	2	2	-

Note 1: Evaluation is based on the course participant's experience

Note 2: Regarding the interconnection of academic and workplace guidance, each participant received the score 1 indicating that interconnection did not take place. These ratings are not presented in the table.

- indicates information missing

1 = low score

2 = medium score

3 = high score