The Agency of Teachers in the 21st Century – Design and Certification of Vocational E-Learning

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Abstract. This paper reports on a case study exploring design and certification of e-learning courses. The focus is on the professional agency of teachers, who gain power to influence, make choices about, and achieve e-learning designs that suit predefined learning needs of particular target groups through the optimum use of digital technology. In the case study, an external certifier provided guidance and formative feedback for the teachers. In total, 23 vocational e-learning courses were designed and certified, and the perceived utility of the process for the teachers was examined, applying a qualitative research approach. The case study provides evidence suggesting that the teachers consider the feedback and certification relevant and useful. In general, they feel that their professional capacity in the area of e-learning design is upgraded in a valuable manner. In particular, they increase their ability to design vocational e-learning courses by using accurate terminology in a consistent manner, making their designs comprehensible for the target group and fostering cooperation at vocational college level. In conclusion, the teachers developed the capacity to act to solve 21st-century educational challenges related to lifelong and technology-enhanced learning.

Keywords: Teachers' professional development, Design of e-learning courses, Certification of e-learning, Technology-enhanced learning, Vocational education.

1 Introduction

Currently, teachers involved in Danish vocational education have to develop their teaching methodologies to meet the changing demands for interplay between school-based and work-based learning activities. Additionally, they have to adjust to the 'bring your own device' principle, which Denmark was the first country to implement fully in all public education [1]. In addition, they have to design e-learning courses tailored to meet lifelong learning objectives of particular target groups through the application of optimum teaching and assessment strategies [2]. Together, these trends have led to disruptive innovation in the work of teachers [3]. This paper reports on a project exploring sustainable ways to meet the needs of teachers for professional development in this state of disruption. Firstly, the aim of the project was to test a new

approach in vocational colleges in Denmark to provide teachers systematically with formative feedback on their design of e-learning courses. Secondly, the aim was to empower teachers to influence, make choices about, and achieve e-learning concepts that suited predefined learning needs of particular target groups through well-founded organisation and use of digital technology.

Previous research provides evidence suggesting that practice-based learning fosters the development of teachers' professional identity and agency [4]. In line with these findings, the project explored an alternative route to traditional in-service courses, workshops, seminars, conferences and degree programmes, in which knowledge obtained is seldom transferred into practice in such a way that it makes a real difference for the participants in teachers' courses [5].

Previous research also provides evidence suggesting that teachers' perceived self-efficacy greatly influences their professional capabilities [6]. Overall, the project aimed to increase this sense of self-efficacy. Unlike teaching methodologies based on intuition and earlier experiences, the project aimed to ensure that the teachers' choices of these methodologies in 1:1 learning environments are based on research knowledge about what influences participants' learning outcomes. In particular, the project aimed to provide feedback for teachers with a view to strengthening their sense of personal mastery, which usually has a positive effect on their agency [7].

Around twenty years ago, researchers carried out a meta-analysis of the provision of feedback, drawing the conclusion that formative feedback has a significant influence on student learning outcomes [8]. Around ten years later, these results were confirmed by means of the well-known meta-analyses of Hattie [9]. Currently, teachers are encouraged to implement these research findings in practice. In the project, the teachers carried out design of assessment activities, including the systematic provision of formative feedback tailored to each of the participants in the e-learning courses. In general, this form of feedback influences their performance as well as learning outcomes of the participants [10].

Until now, Danish teachers involved in education for young people have rarely received formative feedback on their practice from their principals, supervisors or mentors [11]. As a result, they may be inclined to reuse plans that have been used in the past. To avoid this situation, the project aimed to provide formative feedback for teachers regarding high-quality e-learning designs.

This approach, which was new in Danish vocational education, aimed at fostering professional agency. It also sought to ensure that the courses were organised in a consistent manner in relation to learning conditions, competences of potential participants, and their expected learning outcomes. For this reason, the National Danish Knowledge Centre of e-learning (eVidenCenter), in cooperation with the association of Danish Vocational Colleges and Upper Secondary Schools (DEG), piloted a project in the second half of 2018 focusing on guidance, provision of non-automated feedback, and certification of teachers' e-learning course designs.

Table 1 gives an overview of the design template used, which does not represent a new standard but encompasses main themes drawing on contemporary standards regarding the design of learning events.

Table 1. Design template provided by the certifier.

Themes
1. Conditions of e-learning course
2. Learning objectives of this course
3. Prior qualifications of participants
4. Organisation of the course
5. Teaching and learning activities
6. Evaluation of these activities

This template was used to fill the gap between the rhetoric of current standards and actual course designs. In particular, the aim was to fill the gap between educational research and the practice of vocational teachers. All six themes refer to main findings of educational research, focusing on the factors that usually have the greatest impact on participants' learning outcomes.

When vocational teachers design e-learning courses, they are encouraged to consider these six themes carefully, while evolving professionally. Instead of using the template as a manual, they are encouraged to use it as a means to create educationally sustainable e-learning courses of high quality.

Initially, they learned about research findings and quality issues relating to e-learning courses.

Then they:
- *Considered* their e-learning design
- *Submitted* a well-founded e-learning design to the eVidenCenter
- *Received* formative feedback from staff at this external certifier
- *Revised* their e-learning design

Finally, they obtained certification of their e-learning design before it was used.

2 Research Objective

The purpose of the case study was to gain new knowledge about how the quality of the teachers' planning efforts could be ensured by improving their opportunities to receive formative feedback. This included the perceived utility for the teachers of being guided and obtaining feedback when drafting e-learning designs, allowing them to create consistency between the prior knowledge and skills of participants, learning objectives and forms of organisation, activities and assessment in e-learning courses.

Accordingly, the case study generates knowledge about teachers making choices, achieving educationally sustainable e-learning designs, and developing professional agency while receiving feedback from the certifier. Since the teachers had to justify their choices, the study produces knowledge about *what* the teachers chose to do as well as *how* they justified their choices by referring to, among other things, the themes of the design template that was used.

3   Methodology

The case study applied a qualitative design encompassing desk study, observation, document analyses, and interviews. An initial desk study was conducted regarding existing research findings in the area of e-learning course design, focusing on factors that influence participants' learning outcomes. In addition, an initial explorative study was based on observation of the communication and interaction at three national project meetings.

Data were then generated through document analyses of the 23 certified course descriptions and the teacher-certifier dialogue related to these courses. Similarly, data were generated through five interviews with representatives of the teachers and vocational colleges involved. In total, seven teachers were interviewed. To frame their judgements, two additional interviews were conducted with one line manager and one educational consultant. The interviews were semi-structured, with a mix of individual and focus group interviews. The interview guide included the roles of the participants in the project, the design processes aimed at increasing quality of e-learning courses, and the perceived utility of the design template and formative feedback from the certifier.

4   Results

In total, 18 vocational teachers, who provided the 23 course proposals, participated in the case study, and the eVidenCenter provided systematic guidance and feedback to foster professional judgement and agency. Observations at the final project meeting and the data from the five interviews provided evidence indicating that all teachers greatly appreciated this approach. In particular, the guidelines as well the design template were regarded as relevant and valuable, and the teachers who were not familiar with this template before starting the project wanted to continue using it in future. Other teachers would also use the template, adding more themes, including the visualisation of vocational learning content and the use of multimodal materials representing this content.

All teachers also appreciated the certifier's provision of feedback on their draft e-learning course designs. This can be seen in light of the rather limited feedback that teachers normally receive in this context. In general, the provision of feedback, which is closely related to the teachers' drafting of e-learning courses, increased their control over the design process and the choices made.

In all circumstances, the 18 teachers benefited from systematic appraisal and feedback, resulting in course designs taking into account contemporary learning objectives and the prior qualifications of potential participants, duration and blended organisation, teaching and learning activities, and evaluation. The analysis of the e-learning designs submitted and certified provided evidence suggesting that the feedback encouraged the teachers to produce well-founded designs fostering practice-based professional development. Even when starting with plans they had made in the past, they submitted new, well-founded and not yet tested course designs. Most often, the use of

digital technology was an integrated part of the description of these designs. The shortest course was organised in the form of pure online learning, whereas 22 other proposals provided by the 18 teachers were organised in the form of blended learning, i.e. combined school-based and work-based learning in technology-rich contexts. The duration of the courses varied from 4 hours to 185 hours (see Fig. 1).
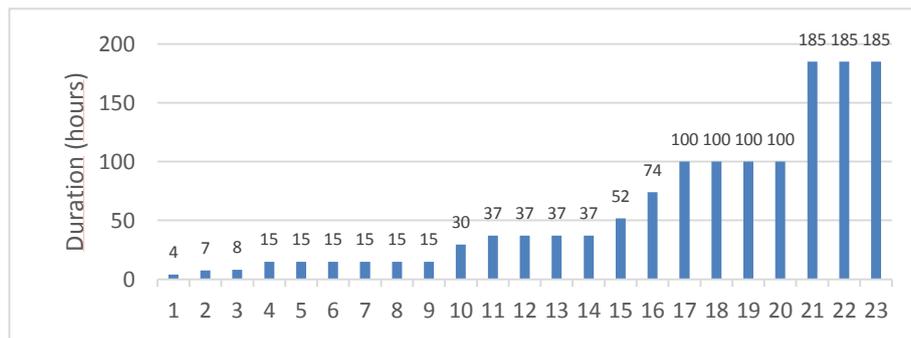

Fig. 1. Certified vocational e-learning courses

The analyses of the 23 final designs provided evidence suggesting that this process led to clear descriptions of the teaching methods of the vocational learning activities. In addition, these analyses provided evidence suggesting that the certified designs described the potential participants' roles and learning objectives in relatively concrete terms, giving these participants a clear picture of what they were expected to do and what they could expect to learn.

Furthermore, teachers stated that the design process created a solid foundation for their choices and justifications regarding the organisation of e-learning courses and the utilisation of digital materials and platforms. Table 2 gives three representative examples of this kind of explicit justification. Further examples can be found in the formal report of the case study [12].

Table 2. Three examples of addressing design issues

Design issue	Example
Organisation	"The form of organization is flexible so that the participants can either attend college or be at their workplace to complete the course and obtain online guidance"
Organisation	"The form of organization is blended learning so that the participants can jointly reflect on their opportunities to use what they have learned in practice and to share experiences and ideas with each other"
Materials	"The different materials and tools are chosen to accommodate different participants. Concrete examples make it easier to understand the theory. The use of supplementary material makes it possible to draw distinctions based on the reading ability and level of abstraction of the participants"

With regard to course organisation, some teachers provided implicit justification due to circumstances, such as predetermined extent of workplace and school-based learning, and the duration of the courses. For example, some participants had to complete part of their course at work, whereas others completed part of their course in particular learning spaces such as industrial kitchens or areas in which forklift trucks operated.

The teachers also provided explicit justifications of their choices regarding, among other things, blended learning activities, individually or team-based guidance, individual or group feedback, and summative evaluation.

When the teachers submitted their draft designs to the certifier, they received critical appraisal and ideas for improvement. Table 3 below gives two representative examples of these issues (from the full range in the formal report [12]).

Table 3. Two examples of feedback provided by the certifier

Issue	Example
Feedback description	"Please improve the description of the feedback and describe what kind of feedback (if any) is involved and how it is given (by whom and in what way)"
Evaluation plan	"The evaluation plan must indicate which learning objectives you want to follow up"

The perceived usefulness provided for teachers included recognition of the quality of e-learning courses (formal approval) and the teachers' own efforts and competences (informal approval). All teachers appreciated receiving inspiration, guidance, feedback and informal approval of their efforts and competences in relation to vocational e-learning courses. According to the teachers, the certification process fostered their capacity building and created a better understanding of e-learning events. Table 4 gives three representative examples of the values of the design template reported by certifiers (from the full range in the formal report [12]).

Table 4. Three examples of perceived usefulness of the design template provided by the certifier

Usefulness of template	Example
Course coherence	"The template helped them to focus on which topics should be considered, and to recapitulate once they have defined learning objectives and translated them into something operational: Did we actually succeed in relation to the evaluation questions?"
Learning objectives	"The companies and the e-learning format require that participants know what is in it for them in advance. This necessitates a clear description of potential participants and the learning goals, including what they are learning to do"
Learning objectives	"The certification template is very useful when developing e-learning courses on new subjects. But it depends on teachers knowing what their learning objectives are"

For the project, a course had to be designed in a consistent way, including detailed descriptions of the continuous feedback strategies and summative evaluation strategies to be certified. Many teachers needed to reconsider these strategies. One theme in the design template was learning objectives. An example of a teacher's thoughts in this area indicated that companies and participants needed to know "what is in it for them in advance", while another teacher regarded the template as very useful but also demanding, since "it depends on teachers knowing what their learning objectives are". Some teachers had to learn to describe learning objectives in a clear and understandable way. This included knowledge about the contemporary terminology of learning objectives, i.e. the European Qualifications Framework (EQS), and some older teachers needed a few hours of introduction to this particular terminology.

5 Discussion

In principle, certification may reduce teachers' autonomy, but the case study did not indicate that this was happening. If teacher autonomy is limited, it is mostly because of predefined conditions regarding, among other things, learning objectives, course duration and the blend of workplace and school-based learning activities. All the teachers involved in the project developed their professional agency by considering and submitting well-founded course designs.

Consistent with these findings, the teachers greatly appreciated developing research-informed practice. Research on formative feedback has been relatively influential in Danish education for young people and adults. In general, there has been a shift in focus from summative assessment and grading to formative assessment and feedback. The results of the case study showed that this should include the teachers themselves, since they greatly appreciated receiving formative feedback on their draft designs from the certifier.

In the vocational colleges, many courses are still designed with little, if any, feedback for the teachers in charge of the design process. By avoiding this form of professional isolation, teachers have benefited from the guidance and professional dialogue tailored to their particular needs and design efforts. Accordingly, the project tested a highly relevant and useful way to foster innovation in terms of feedback to teachers.

In particular, the project professionalises the design processes of the teachers. The certified course designs all represent rather detailed descriptions of learning objectives as well as assessment strategies, including formative evaluation to foster learning activities during courses and summative evaluation at the end of courses. So far, it has been difficult to promote research-informed practice owing to teachers' workloads. However, the results show that the project has discovered a sustainable approach to achieve this goal, making research-based knowledge about the quality of e-learning courses more accessible for teachers and easier for them to use.

Around the world, there is currently a tendency to organise teachers into teams [13]. For example, some vocational colleges build learning organisations, which implies shared visions and team learning as well as collaborative course design. Other colleges introduce professional learning communities, which similarly involve team

learning. However, these initiatives are not completed in the Danish vocational education and training system. Until now, most vocational teachers have worked independently in relative isolation, even though they meet regularly with colleagues who teach the same subject. Accordingly, they often have to try ideas out themselves without appropriate support. When it comes to course design, there is a huge potential in sharing knowledge and ideas about innovative e-learning design at or across vocational colleges. The results of the case study showed that the project realised this potential.

In this context, teamwork "implies talking about practice and sharing ideas and problems" on a regular basis [14]. If the vocational colleges do more than merely introducing teams, professional teamwork can be regarded as one of the reasons why some colleges succeed whereas others fail when implementing innovative teaching methodologies [15]. Accordingly, the vocational colleges involved in the project succeeded due to the teachers' practice-based and collaborative professional development.

None of the teachers worked in professional isolation during the design and certification process. At some vocational colleges, three teachers, each designing an e-learning course, meet regularly to promote knowledge sharing and to support each other. At other vocational colleges, individual teachers designing e-learning courses communicate intensively with either a line manager or an e-consultant, or both. Additionally, three teachers from three different vocational colleges could build a team to initiate cross-college knowledge sharing related to one common e-learning design.

In this context, the concept of *knowledge sharing* designates a process whereby vocational teachers increase their professional capacity by sharing knowledge about quality parameters related to e-learning events. Previously, knowledge sharing has often been an illusion, because teachers have simply exchanged their experiences at meetings or during breaks [16]. In these circumstances, only a little knowledge becomes common. This situation calls for knowledge sharing formats in which the teachers inform and inspire their colleagues to such an extent that these colleagues learn to improve their practice. When they build on knowledge obtained from colleagues, they do not have to experiment from scratch with new learning objectives, assessment methods, organisational forms, digital materials, and technology applications.

For this reason, the project used an alternative and educationally sustainable method of overcoming the previous lack of knowledge sharing related to designing e-learning courses. In consequence, the project fostered knowledge sharing between teachers and their line managers. This included scenarios in which teachers shared knowledge, collaborated and acted as highly valued critics of each other's work when planning vocational e-learning courses.

6   Conclusion

This paper presents the results of a case study conducted in the last part of 2018 on the development of professional judgement and agency in e-learning design. The

purpose was to investigate the perceived utility for vocational teachers of being guided and obtaining formative feedback from an external certifier while planning vocational e-learning courses. The case study provided evidence suggesting that this approach bridges the gap between research- and practice-based knowledge, and that the teachers strengthen their professional judgement and agency. The provision of formative feedback by an external certifier represents a valuable and sustainable approach to ensuring quality e-learning courses as well as teachers' capacity building in the area of innovative teaching methodologies in technology-rich environments. In conclusion, the perceived value of this practice-based professional development is high.

This project could be generalised to apply to providers of e-learning courses wanting to ensure the quality of such courses and develop professional judgement and agency regarding the courses. Future directions of research and development in vocational colleges could then include replication on a larger scale. Currently, a number of new e-learning courses have been submitted to the certifier for critical appraisal and ideas for improvement. Since some of these courses involve teachers at general adult education centres, the future directions thus include e-learning designs in the field of general education in a broad sense. Future directions of research could also include the certification of certifiers, enabling vocational colleges to have their own educational supervisors. These supervisors could subsequently act as mentors and provide feedback for teachers who are planning e-learning courses in their colleges using the formative feedback approach tested in the project and reported in the case study.

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