

A Holistic Learning-Model For Continuous Improvement In Risk Management Education

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ABSTRACT

Course design and follow-up influence learning quality in risk management education and are activities that should be evaluated on a regular basis. However, which factors these activities should be planned according to or evaluated against is not obvious. Literature on learning emphasises several aspects of relevance to the factors, including constructive alignment between the learning objectives, activities and assessment; the theoretical foundation; student engagement; feedback; and the frame conditions, such as time, competence, localities and equipment. In this paper, these aspects are seen in relation to each other and merged into a holistic model for learning, motivated by emergency response planning and the principle of continuous improvement. The model illustrates different factors that affect learning and can be used to describe, analyse and evaluate learning in higher education. To exemplify the model, it is used to evaluate questionnaires and report templates for the students' evaluation of teaching and learning and, further, to evaluate the course design and teaching work on courses in a master's programme in risk management and societal safety at a Norwegian university.

Keywords: risk management education; course design; formative feedback; learning model; reflection, student engagement.

INTRODUCTION

Risk management education is characterised by topical focuses on value creation, vulnerability, protection and decision-making under uncertainty, and should in some way capture needs in industry and society. Challenges related to company insurance practice are an integral part of this picture (Andreeva, 2021; Poradova & Kollar, 2020). As such, risk management students are typically exposed to a variety of theoretical and practical challenges linked to a set of learning objectives, where course design is an important variable. For this design, the courses should have a structure allowing students to achieve the relevant skill, knowledge and competence goals. The students themselves have a role in providing feedback related to course design and teaching quality.

Evaluation of course design and follow-up activities is important for learning quality for education in general but perhaps even more so for risk management education, with its multitude of applications. A key issue in this regard is which factors the teaching work and course design should be planned according to and evaluated against. To ensure high quality, evaluation of the design and the associated teaching and learning activities is essential. Students typically evaluate their courses on the basis of their experience, and their satisfaction relates particularly to the teaching and course organisation (Centoni & Maruotti, 2021), with course grades being positively correlated with scores on course evaluation instruments (Wang & Williamson, 2022).

Evaluation of learning in risk management education is a highly challenging task, which could be claimed to be 'imperfect'. Regarding the use of evaluation questionnaires, Nielsen and Kreiner (2017) argue that evaluations rarely disclose problems that a conscientious teacher does not already know about and, as such, provide a poor basis for course development. White et al. (2022) add to that, by showing that measurement and analysis choices used by classroom observation systems do not fully align with the conceptual understandings of teaching upon which observation systems are based. Moreover, based on a systematic literature review, McFadden and Williams (2020) conclude that there is a lack of knowledge about teachers' evaluative capabilities and how they employ these to understand the effectiveness of their teaching and learning programmes. In the literature reviewed, there was almost no focus on specific evaluation skills for teachers and no evidence of an explicit focus on the development of evaluative skills and attitudes in teacher education (McFadden & Williams, 2020). Similarly, in another literature review, Lohman (2021) found that basic principles of evaluating teachers' employee performance, principles that are well-established in human resource literature, are non-existent in ongoing debates on student evaluations of teaching.

To ensure learning quality, Gynnild (2007) emphasises the importance of a quality system that gains insights into the mechanisms that hinder and promote intended learning. This is supported by Wang and Williamson (2022), who propose the following recommendations to provide a more objective evaluation of teaching quality through course evaluation instruments: "quality design of the instrument, an attention to qualitative items, university level internal analyses, a portfolio approach to instructor evaluation, and increased efforts to tease out the nature of the relationship in future research" (p. 316).

In this article, we propose a model for describing, analysing and evaluating learning in higher education, which is based on factors important for learning. Scholars (e.g., Beckett & Hager, 2002; Hager, 2011; Sfard, 1998) differentiate between two ways of understanding learning related to professional practice, work and education. The 'individual cognitive approach' focuses on individuals as learners, where learning is understood as the acquisition of information and experiences (Ormrod, 2008; Bandura, 1977). 'Cognitive' here refers to mental processes: "the perception, encoding, storage, transformation, and retrieval of information — within individual minds" (Danish & Gresalfi, 2018). The individual's mental processes are regarded as central when this is transformed into knowledge, thus making reflection a crucial activity (see, e.g., Boud et al., 2006; Moon, 1999; Ormrod, 2008). The 'socio-cultural approach' to learning shifts the focus to social relations. Weick (1995) sees the mental processing of collective-social experiences and interactions as key to sensemaking. It is about how the environment influences perception. Attention thus shifts from the processing of information and the modifying of cognitive structures to the processes of participation and interaction that provide and sustain the proper context for learning (Gherardi et al., 1998). Hence, learning is situated in and occurs through processes of participation and interaction in educational or work-related activities, which makes contextual factors, interpersonal relationships, social climate and cultural artefacts decisive for learning to occur (see e.g., Billett, 2010; Eraut, 2004; 2007; Lave and Wenger, 1991; Wenger, 1998).

Some argue, however, that the two approaches complement each other and are both needed to fully explain individual learning. Illeris (2007; 2011), for example, argues that learning requires that both external interaction between the individual and the social, cultural and material environment and inner psychological processes within the individual take place. Emergency response organisations are a particular example where such a complementary perspective is adopted. These are organisations where learning is given a high level of attention, as the work of emergency response personnel is often dangerous and unpredictable, with lives at risk (Taber et al., 2008). Sommer (2015) has studied learning in these organisations, showing that both socio-cultural and individual aspects need to be considered to fully understand and explain how individuals develop competence. Adding to this, Sommer et al. (2013) have formulated a model for describing, analysing and planning learning, where the focus is on how individuals learn through a combined approach to learning in emergency response work. Bjørnsen et al. (2022) have assessed the model empirically with data from a national survey among Norwegian fire and rescue personnel, examining the factorial structure of the model and describing the direct and indirect effects between its

components. Their results confirm the theoretical model and indicate that the outcome of learning is influenced by the model's components.

We argue that the complementary perspective and model capturing both a socio-cultural and an individual aspect for learning and continuous improvement could also be relevant for other organisations and might add value to planning in higher education. It thus represents a tool worthy of investigation. In this paper, the model is reformulated and adapted specifically to learning in risk management education at master's level.

For a holistic perspective, we also use our model as a basis for the assessment of different evaluation questionnaires and report templates used to evaluate teaching and learning. The focus is on the university internal quality system for education, in addition to the Norwegian national student survey (Studiebarometeret).

DESCRIPTION OF A MODEL FOR LEARNING IN EMERGENCY RESPONSE WORK

Sommer et al. (2013) link learning to decision-making, where the socio-cultural and individual aspects influence how individuals learn and respond to accidents and emergencies (see Figure 1).

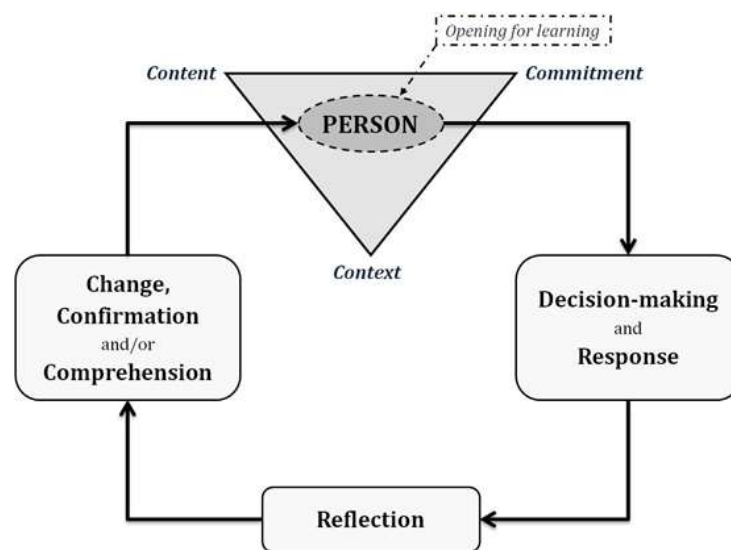


Figure 1. Model for learning in emergency response work (Sommer et al., 2013).

In the model, the person is someone entering a learning process. For this person to learn, there must be a knowledge or skill content to acquire. This content could be specific skills, a certain kind of behaviour, how to understand and interpret situations or how to operate technology and tools. The context is the learning environment in which this acquisition takes place. According to the socio-cultural approach, participation and interaction between colleagues are vital for learning. Environmental factors and contextual features are thus highlighted. Finally, individuals' commitment (i.e., involvement in learning activities) also plays a role. With reference to the individual cognitive approach, both mental and physical activities are of relevance.

The decision-making and response element in the model refers to the person's performance in a real emergency situation or in a training situation. The response reflects the decisions made, which will lead to the outcome of the situation (see, e.g., Flin et al., 2008; Rake and Njå, 2009; Salas et al., 2010).

Reflection is another element of the model. According to Kolb (2015) and Schön (1983), reflection constitutes the essence of learning in an individual cognitive approach. For individuals to learn from emergency

response situations, they need to reflect on their performance (i.e., their decision-making and response) and the usefulness of their skills and knowledge.

The reflection could result in, for example, change in behaviour, confirmation of existing knowledge or new comprehension of knowledge. The result is captured in the model by the element called ‘change confirmation and/or comprehension’. This refers to ways to categorise the outcome of learning (Braut and Njå, 2010).

For a more detailed description of the model and its theoretical foundations, see Sommer et al. (2013).

A MODEL FOR LEARNING IN HIGHER EDUCATION. A REFORMULATED VERSION OF THE MODEL FOR LEARNING IN EMERGENCY RESPONSE WORK

For learning, it matters what the students themselves do to learn. Biggs (1999) sees this in relation to a deep approach to learning and opportunities for reflection. To achieve this, learning objectives, teaching and learning activities and assessment must be aligned (ibid.), with all three elements motivating reflection. The alignment is illustrated in Figure 2.

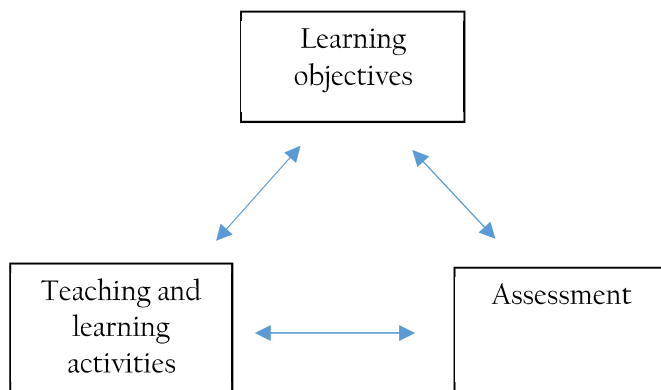


Figure 2. The link between curriculum objectives, teaching/learning activities and assessment tasks in a course design (Biggs, 1999).

In course design, the learning objectives indicate knowledge and skills that students should acquire through the course. The learning processes can then be developed accordingly, so that students are able to achieve the intended learning outcomes (Biggs, 1999; Gynnild, 2010). Gynnild describes this as backwards planning of courses (see Figure 3). The word ‘backwards’ is used, as the planning starts with the desired results and then identifies evidence necessary to determine whether the results have been achieved. With the results and assessments clearly specified, the lecturer can determine the necessary knowledge and skill and, only then, the teaching needed to equip students to perform (see Wiggins & McTighe, 2005).

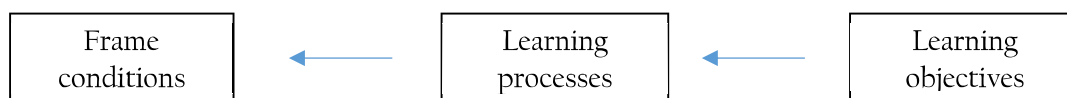


Figure 3. Backwards planning of course design and activities (Gynnild, 2010).

With reference to Figures 2 and 3, and by shifting focus from emergency response workers to students, a model for learning in a university teaching context can be established. The reformulated model in Figure 4 points, instead, to relevant learning factors. In Sections 3.1 to 3.6, we describe the elements of the model.

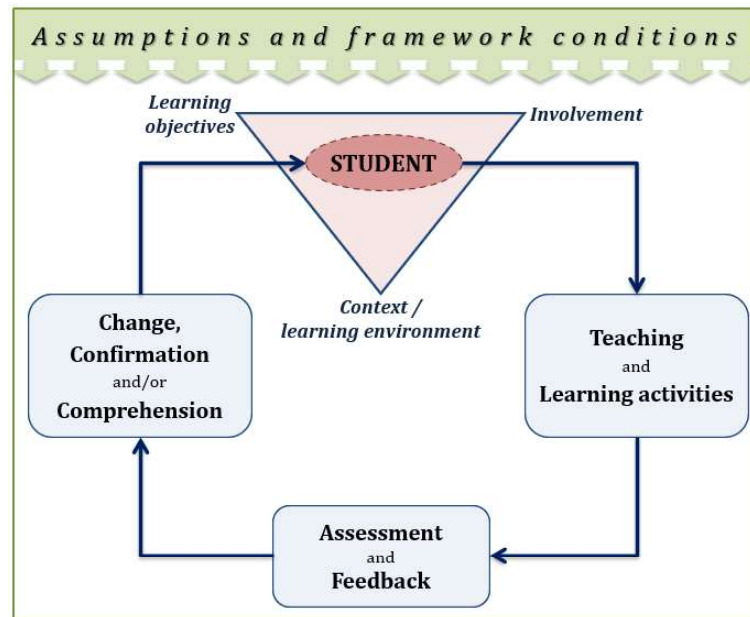


Figure 4. Learning in higher education.

Student and learning objectives, involvement, context/learning environment

The focus is on what the students themselves do to learn. From a constructivist view, learning occurs as the acquisition of knowledge and skills through experience and information acquired (Jonassen, 1992). What the student has to learn constitutes the intended content of the student’s learning and is expressed through the learning objectives. To achieve good learning, the intended content and learning objectives must be geared towards a deep approach to learning, i.e., a focus on understanding rather than memorising and acquiring facts and procedures (Biggs, 1999; Gibbs, 1992). Here, however, a distinction can be made, depending on the study level and learning objectives. Case and Marshall (2004) describe the learning approaches, ‘procedural deep’ and ‘procedural surface’, as two “intermediate approaches” to the classic depth and surface approaches to learning. For the procedural deep approach, the goal is to achieve a deeper understanding of the content, for example by relating different formulas/procedures to each other and through practical exercises in problem-solving, while, for the conceptual deep approach, the goal is, rather, to achieve a deeper understanding of phenomena and concepts.

Ownership and personal involvement are pointed to as important for in-depth understanding. However, the involvement of students in a teaching situation does not happen automatically; a context facilitating and promoting involvement is needed. According to the socio-cultural approach, learning is something happening in “collaboration with others” (Hernandez et al., 2015). It is seen as a natural human trait and something that is situated and happens through participatory processes (Lave & Wenger, 1991). Learning comes from observation of others (Bandura, 1977) but also from dialogue and interaction with more competent people (Vygotsky 1978). The learning environment in the teaching situation is something that both Hernandez et al. (2015) and Bain (2004) emphasise as important for students’ learning.

The three elements, i) learning objectives, ii) student involvement and iii) context or learning environment, influence students’ ability to learn and can be seen as essential for learning. However, it is important to understand

what influences these elements. When designing the teaching plan, for example, Gibbs (1992) claims that aspects such as what activates the students and motivates them to learn should be considered.

Teaching and learning activities

For students to successfully achieve the intended learning outcomes, appropriate teaching and learning activities should be applied, and these should promote the development of in-depth understanding (Biggs, 1999). The activities obviously have a strong influence on the learning environment. A variety of teaching and learning activities are relevant for this: from traditional lectures and self-study/problem solving, to seminars, group work and project assignments. However, the full learning environment might not be visible to the lecturers. As noted in Symons (2021), with reference to the 'iceberg of engagement' analogy, 'beneath the surface' "considerable engagement and learning can be taking place". We refer to Schmidt et al. (2017) for a discussion of different activities in relation to student engagement.

Involvement is already mentioned as crucial for learning. This points also to student engagement, as there is a belief that learning improves when students are fully involved in their learning (Deslauriers et al., 2019). Problem-based learning, case studies and project work are highlighted in this context as particularly suitable (Kolmos, 1996). These are activities promoting ownership and collaboration, aspects for example pointed to in the development of the LEAP framework for student learning development (McIntosh & Barden, 2019). It indicates, as Bain (2004) argues, that it is not necessarily the activity type that is crucial but how the students are addressed, for example when using questions (problems) in teaching:

- 1) questions are asked that students find interesting and challenging and, not least, relevant to the practice of the profession after graduation;
- 2) students are helped to understand the importance of the questions;
- 3) students must "think for themselves" through, e.g., comparing, applying, evaluating, analysing and summarising, not just listening, reading and remembering;
- 4) students receive help with answering the questions; and
- 5) after answering the questions, students should be provided with new questions which take them a step further.

Assessment and feedback

Assessment is often a part of the course design. Biggs (1999) claims that assessment should be performed in accordance with both the learning objectives and the teaching and learning activities, to ensure good learning. Assessment is of special importance for both students and educational institutions, as it provides information about the students' academic achievements and qualifications after completing the course (Sadler, 2009; 2010). In addition, students usually prioritise activities in which they are evaluated and awarded, which means that they are most involved in the assessment activities and therefore learn most from working with these activities (see Gibbs, 1999; Hargreaves, 1997; Alhija, 2017; Kickert et al., 2022). Students' perceptions of assessment quality are also related to their learning approaches and learning outcomes (Gerritsen-van Leeuwenkamp et al., 2019); perceptions of the effects of assessment on learning are positively related to the deep learning approach and the strategic learning approach and negatively related to the surface approach, and perceptions of the conditions of assessment are positively related to the students' learning outcome of the assessments. Furthermore, we refer to Schellekens et al. (2021) for a review of the association between assessment and learning.

For assessments to truly represent the student's academic achievement, Sadler (2009) recommends that academic standards are used as the basis for evaluating students' performance (in contrast with a norm-based assessment, where student performance is assessed against the performance of, e.g., a group of students). The standards used for assessment should be designed specifically according to the content of the course. Bloxham (2012) claims they are a fundamental basis for universities' credibility. We refer to Bloxham (ibid.) for a discussion around the use of academic standards.

Ideally, assessments should provide students with feedback on their performance and should then be a tool for improving their performance (Carless, 2015; Sadler, 2010). But, as Sadler (ibid.) argues, for this to contribute to improvement, feedback should be formative, regardless of when given. Specific, concrete and organised feedback allows students to improve their performance. This is supported by Granberg et al. (2021), who found that formative assessment practice has a significant effect on both students' motivational beliefs and behaviours involved in the self-regulation of learning. Evans (2013) also adds socio-cultural aspects as important in this regard.

Change, confirmation and/or comprehension

Assessments and feedback might lead to change, confirmation and/or comprehension related to knowledge or skills. Traditionally, learning as a concept refers to something that leads to changed behaviour or cognition (see, e.g., Illeris, 2007; Ormrod, 2008), which could be the case if a student receives constructive feedback and makes changes before the assignment is submitted. But, in addition to changes, learning can also be related to confirmation and comprehension of knowledge or skills. If a student receives feedback that, say, calculations are correct, there is no need for change. Nevertheless, such feedback can still contribute to learning, since the student receives feedback on what is correct and, implicitly, that the same approach for calculation can be adopted for similar problems in the future. In other words, confirmation is a form of positive reinforcement, which is important to the individual cognitive approach to learning (see Ormrod, 2008). Comprehension is a step further. For comprehension, the student should then have deeper understanding of the content studied.

Assumptions and framework conditions

Assumptions and framework conditions refer to external factors normally outside the control of students and lecturers but which influence the teaching and learning frame. For example, at the institution, there might be a certain pedagogic design that the lecturers must adopt. Related to workload, the students might also attend other courses with activities influencing the time they may spend on the course. Location is also of relevance. For example, the lecture rooms might have limitations and not be suited to the pedagogic design. Another example is the changes triggered by the COVID-19 pandemic situation in 2020, where classrooms were closed and teaching and examinations became digital. All these factors influence the way a course is presented to students and the way the students work, and they should be considered when assessing students' learning.

The learning model as a continuous process

The model focuses on various factors influencing student learning on a course. It must be emphasised that, in the model, learning is seen as a continuous process, from the start of the course until the result of the final examination is received. Instead of a traditional one final examination, on which everything stands and falls, a type of portfolio-based assessment could be considered. Tolosa Bailén and García Bernabeu (2012) consider continuous assessment, with a portfolio of assessments, as an effective alternative to the traditional ways. In addition, students underway on the course could seek and receive constructive feedback from fellow students and the lecturers, beyond the formal assessments, adding to the learning.

ANALYSIS OF EVALUATION QUESTIONNAIRES AND REPORT TEMPLATES USED TO EVALUATE TEACHING AND LEARNING

To evaluate teaching and learning, the university uses its internal quality system for education, in addition to results from the Norwegian national student survey. In this section, we analyse the evaluation questionnaires and report templates used, to see which elements of the model for learning in higher education (see figure 4) are covered and have information collected about them.

Table 1 is used as starting point for our analysis. In the first column, we list all the questions in each of the evaluation forms or surveys analysed. In the next columns, we include all the dimensions from the model of learning

in higher education. Nine dimensions are included: student; learning goals; context; involvement; teaching and learning activities; assessment; feedback; change, confirmation and/or understanding; and assumptions and framework conditions. For each question, we see which elements are covered and have information collected about them. For each question, we mark “x” for those elements of the model for learning in higher education that are covered and information collected about. The table was first filled in by all the authors of this paper. For those questions with different conclusions about the dimensions covered, consensus was reached after discussions. Note that the categorisation of each question is not absolute, and some questions may also fit into several categories. In the second row of the table, we summarise the number of questions covering each of the various elements in the model. We then obtain an overview of which dimensions are covered by many, few or no questions in the various surveys. All the evaluation questionnaires and report templates used in this analysis are from 2022. We have omitted all the COVID-related questions, as these cover an extraordinary situation. The questions in the different surveys are usually modified every year, but the differences from year to year are usually relatively small.

Table 1. Basis for evaluation of which elements in the model for learning in higher education are covered by different student evaluation questionnaires.

| Student Survey | Student | Learning objectives | Context | Involvement | Teaching and learning activities | Assessment | Feedback | Change, confirmation and/or comprehension | Assumptions and framework conditions |
|---------------------------|---------|---------------------|---------|-------------|----------------------------------|------------|----------|-------------------------------------------|--------------------------------------|
| Total number of questions | # | # | # | # | # | # | # | # | # |
| Category X | | | | | | | | | |
| Question 1 | | | | | | | | | |
| Question 2 | | | | | | | | | |
| ... | | | | | | | | | |
| Category Y | | | | | | | | | |
| Question 1 | | | | | | | | | |
| Question 2 | | | | | | | | | |
| ... | | | | | | | | | |

The university’s internal quality system for education

The internal quality system is a three-tier quality system for all studies at Bachelor’s, Master’s, and PhD levels. The division comprises quality in courses, study programmes and study portfolios. Reports constitute important documentation, and the quality work at the study programme level and the study portfolio level mainly builds on information collected at the course level. Information at the course level is collected through dialogues with students and a digital course evaluation and then summarised in a course report.

Dialogues with students, named “Early dialogue”, must take place at an early stage during the semester, each time a course is taught. These dialogues shall be conducted between the course coordinators and the students, with the aim of receiving feedback from students in respect of changes and adjustments to be made during the course for the current semester. The course coordinators and student representatives write a brief summary of the discussions that will form part of the basis for the course reports. The question in the template for the early dialogue is shown in Table 2, together with all nine elements of the model for learning in higher education.

Table 2. Elements in the model for learning in higher education covered by the early dialogue questionnaire.

| Early dialogue | Student | Learning objectives | Context | Involvement | Teaching and learning activities | Assessment | Feedback | Change, confirmation and/or comprehension | Assumptions and framework conditions |
|------------------------------------------------------------------------------------------------------------------------------------------|---------|---------------------|---------|-------------|----------------------------------|------------|----------|-------------------------------------------|--------------------------------------|
| Total number of questions | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 0 |
| Lectures: How do you find the lectures? | | | | | | | | | |
| Information about course and syllabus: Have you received the necessary information about the course and is the syllabus clearly defined? | | x | | | | | | x | |
| Canvas: How does the use of Canvas work? | | | | | | | | x | |
| Feedback: Is the feedback you receive on your work sufficient? | | | | | | | x | | |
| Other topics: Other conditions that work well or that should be addressed? | | | | | | | | | |

Digital course evaluations are a standardised student evaluation of courses that shall be carried out at the end of the semester. The purpose is to collect anonymously the students' experiences of the course, and the results are presented in a report automatically generated from the survey. The questions used in the digital course evaluation are shown in Table 3, together with all the elements of the model for learning in higher education.

Table 3. Elements in the model for learning in higher education covered by the digital course evaluation questionnaire.

| Digital course evaluation | Student | Learning objectives | Context | Involvement | Teaching and learning activities | Assessment | Feedback | Change, confirmation and/or comprehension | Assumptions and framework conditions |
|--------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------------------|---------|-------------|----------------------------------|------------|----------|-------------------------------------------|--------------------------------------|
| Total number of questions | 4 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 2 |
| Own involvement | | | | | | | | | |
| Approximately how many hours per week (on average throughout this semester) have you spent on this course (self-study, lectures, seminars etc.)? | x | | | | | | | | |
| How satisfied are you with your own effort in this course? | x | | | | | | | | |
| Have you participated in any organized learning/teaching activities in this course (lectures, seminars etc.)? | x | | | | | | | | |
| To what degree did you achieve the learning outcomes for the course? | x | | | | | | | | |
| Teaching and learning | | | | | | | | | |
| Does the teaching in this course convey the curriculum in an understandable way? | | | | | x | | | | |
| Do the organized learning/teaching activities contribute to your learning? | | | | | x | | | | |
| Was the use of digital tools appropriate to support your learning? (This does not refer to streaming/recording of lectures) | | | | | | | | | x |
| Communication | | | | | | | | | |
| How satisfied are you with the information you have received about this course (on Canvas, etc.)? | | | | | | | | | X |
| How satisfied are you with the feedback and guidance in this course? | | | | | | | x | | |
| Learning environment | | | | | | | | | |
| How satisfied are you with the academic and social environment among the students in this course? | | | x | | | | | | |
| Overall satisfaction | | | | | | | | | |
| How satisfied are you, overall, with this course? | | | | | | | | | |

Course reports must be written by the course coordinator once a course has been completed. The course report shall express the course coordinator's own assessment of what is working well and what should be changed in the course, based on dialogues with the students early in the semester and results from the digital course evaluation at the end of the semester, in addition to discussions with other lecturers if they have taken part in the course. The questions to be answered and elements to be addressed in the course report are shown in Table 4, together with all the elements of the model for learning in higher education.

Table 4. Elements in the model for learning in higher education covered by the questionnaire in the course report.

| Course report | Student | Learning objectives | Context | Involvement | Teaching and learning activities | Assessment | Feedback | Change, confirmation and/or comprehension | Assumptions and framework conditions |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------------------|---------|-------------|----------------------------------|------------|----------|-------------------------------------------|--------------------------------------|
| Total number of questions | 0 | 0 | 0 | 0 | 3 | 1 | 2 | 0 | 0 |
| Evaluation form | | | | | | | | | |
| How was the course evaluated by the students? (Discussions with students, Discussions with student representative, Standardised student evaluations, Additional information) | | | | | | | | | |
| Teaching method | | | | | | | | | |
| What tuition and learning methods have been practised during the course this semester? | | | | | x | | | | |
| Coursework | | | | | | | | | |
| What compulsory tuition activities have been used during the course? | | | | | x | | | | |
| Form of assessment | | | | | | | | | |
| What forms of assessment have been used during the course? | | | | | | | | | |
| Student guidance | | | | | | | | | |
| Please specify what forms of feedback/supervision the students have received during the course | | | | | (x) | | x | | |
| Feedback | | | | | | | | | |
| Please write a short summary of student feedback. Relevant topics here may include: Were any suggestions made about improvements/changes during the early discussions? Was anything done about it, and if so, what? What is the feedback in the standardised student evaluations (UiS Insight Education)? Is there anything in this feedback that will result in changes next year? According to the students, what worked well and what didn't work so well? | | | | | | | x | | |
| Assessment | | | | | | | | | |
| Assessment related to the course. Different questions on assessment of learning outcome descriptions, form of learning, context, teaching materials, etc. | | | | | | x | | | |

In Table 5, we show the total number of questions covering each dimension in the model for learning in higher education. From this summary, we see that many of the dimensions are only covered to a small extent. The involvement is not covered in either the early dialogue, digital course evaluation or in the course report. This means that limited help and limited information are provided, which means that it is up to each course coordinator and lecturer to collect any additional information, to make an evaluation of the learning on each course.

Table 5. The total number of questions in the different forms used by UiS (part of the internal quality system for education), covering each of the elements in the model for learning in higher education.

| | Student | Learning objectives | Context | Involvement | Teaching and learning activities | Assessment | Feedback | Change, confirmation and/or comprehension | Assumptions and framework conditions |
|-----------------------------------------------------------------------------------------|---------|---------------------|---------|-------------|----------------------------------|------------|----------|-------------------------------------------|--------------------------------------|
| Early dialogue Total number of questions | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 0 |
| Digital course evaluation Total number of questions | 4 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 2 |
| Course report Total number of questions | 0 | 0 | 0 | 0 | 3 | 1 | 2 | 0 | 0 |
| Early dialogue + Digital course evaluation + Course report Total number of questions | 4 | 1 | 1 | 0 | 5 | 1 | 4 | 2 | 2 |

Norwegian national student survey (Studiebarometeret)

The Norwegian national student survey is a survey sent to more than 70,000 students in their 2nd and 5th academic year, each autumn. The survey asks for the students' perceptions of educational quality in their study programmes. The purpose of the survey is to strengthen the quality of work in higher education and give useful information about educational quality. The portal for the survey, where new results are published in February each year, provides information for applicants, students, institutions and members of staff and others with an interest in higher education. The survey is initiated by the Norwegian Ministry of Education and Research and conducted by the Norwegian Agency for Quality Assurance in Education (NOKUT).

The questions to be answered and elements to be addressed in the study are shown in Table 6, together with all the elements of the model for learning in higher education.

Table 6. Elements in the model for learning in higher education covered by the Norwegian national study survey.

| Student Survey (Studiebarometeret) | Student | Learning objectives | Context | Involvement | Teaching and learning activities | Assessment | Feedback | Change, confirmation and/or comprehension | Assumptions and framework conditions |
|------------------------------------------------------------------------------------|---------|---------------------|---------|-------------|----------------------------------|------------|----------|-------------------------------------------|--------------------------------------|
| Total number of questions | 41 | 15 | 10 | 5 | 7 | 4 | 17 | 0 | 39 |
| Teaching | | | | | | | | | |
| To what extent do you agree with the following statements? | | | | | | | | | |
| The academic staff make lectures and seminars engaging | | | x | | | | | | |
| The academic staff convey the curriculum in an easy-to-understand manner | | | x | | | | | | |
| The teaching covers central parts of the curriculum well | | x | | | | | | | |
| The teaching is organised so as to facilitate active student participation | | | | x | | | | | |
| Extent of feedback and academic counselling | | | | | | | | | |
| This far in your studies, how often have you: | | | | | | | | | |
| Received feedback from academic staff on your written work before final submission | | | | | | | x | | |
| Received feedback from academic staff after final submission of your work | | | | | | | x | | |
| Received feedback from academic staff on non-written work | | | | | | | x | | |
| Received feedback from other students on written or non-written work | | | | | | | x | | |

| | | | | | | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--|-----|-----|-----|--|---|--|---|--|---|
| Discussed academic issues with academic staff | | | | | | | | x | | |
| Discussed your academic progression/results with academic staff | | | | | | | | x | | |
| Feedback and academic counselling | | | | | | | | | | |
| <i>How satisfied are you with:</i> | | | | | | | | | | |
| The number of times you have received feedback from academic staff on your work | | | | | | | | x | | |
| The academic staff's ability to give constructive feedback on your work | | (x) | (x) | (x) | | | | x | | |
| Your fellow students' ability to give constructive feedback on your work | | (x) | (x) | (x) | | | | x | | |
| Academic supervision and discussions with academic staff | | | | | | | | x | | |
| Academic and social environment | | | | | | | | | | |
| <i>How satisfied are you with:</i> | | | | | | | | | | |
| The social environment among the students in the programme | | | x | | | | | | | |
| The academic environment among the students in the programme | | | x | | | | | | | |
| The relationship between the students and the academic staff in the programme | | | x | | | | | | | |
| The study environment and infrastructure | | | | | | | | | | |
| <i>How satisfied are you with:</i> | | | | | | | | | | |
| Rooms for teaching and general studies | | | | | | | | | | x |
| Equipment and tools used in teaching | | | | | | | | | | x |
| The library and library services | | | | | | | | | | x |
| ICT tools and services (e.g., teaching platforms, software and PC availability) | | | | | | | | | | x |
| Organisation of the study programme | | | | | | | | | | |
| <i>How satisfied are you with:</i> | | | | | | | | | | |
| The availability of information about your study programme | | | | | | | | | | x |
| The quality of information about your study programme | | | | | | | | | | x |
| The administrative organisation of your study programme (e.g., teaching schedules, study plans) | | | | | | | | x | | |
| The extent to which courses in your study programme are academically connected and well-integrated | | | | | | | | x | | |
| Student assessment | | | | | | | | | | |
| <i>To what extent do you find that examinations and other assignments so far have:</i> | | | | | | | | | | |
| Concerned central parts of the curriculum | | | | | | x | | x | | |
| Required comprehension and reasoning skills | | | | | | x | | x | | |
| Had clear evaluation criteria | | | | | | x | | x | | |
| Contributed to your academic development | | | | | | x | | x | | |
| Student participation | | | | | | | | | | |
| <i>To what extent do you experience that students have the opportunity to provide feedback on the content and structure of the study programme?</i> | | | x | | | | | x | | x |

| | | | | | | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--|--|--|---|---|--|---|---|
| The study programme's ability to inspire you | | | | | | | | | |
| To what extent do you find that the programme: | | | | | | | | | |
| Is stimulating | x | | | | | | | | x |
| Is academically challenging | x | | | | | | | | x |
| Contributes to motivation to work on your studies | x | | | | | | | | x |
| Your learning outcomes | | | | | | | | | |
| How satisfied are you with your own learning outcomes so far, concerning: | | | | | | | | | |
| Theoretical knowledge | x | | | | | | | | |
| Knowledge of scientific work methods and research | x | | | | | | | | |
| Experience with research and development work | x | | | | | | | | |
| Discipline- or profession-specific skills | x | | | | | | | | |
| Critical thinking and reflection | x | | | | | | | | |
| Cooperative skills | x | | | | | | | | |
| Oral communication skills | x | | | | | | | | |
| Written communication skills | x | | | | | | | | |
| Innovative thinking | x | | | | | | | | |
| Ability to work independently | x | | | | | | | | |
| Motivation | | | | | | | | | |
| To what extent do you agree with the following statements: | | | | | | | | | |
| I am motivated to work on my studies | x | | | | | | | | |
| I participate in the organised learning activities that are offered | x | | | | | x | | | |
| I show up well prepared for organised learning activities | x | | | | | x | | | |
| I consider myself a hard-working student | x | | | | | x | | | |
| Expectations | | | | | | | | | |
| To what extent do you agree with the following statements: | | | | | | | | | |
| The academic staff set clear expectations for me as a student | x | | | | | | | | x |
| The academic staff expect me to come prepared to organised learning activities | x | | | | | | | | x |
| The academic staff expect me to participate actively in organised learning activities | x | | | | | | | | x |
| The academic staff have high academic expectations for me | x | | | | | | | | x |
| Use of digital tools | | | | | | | | | |
| By digital tools we are referring to, for instance: Digital teaching platforms (Canvas, Blackboard, I ² learning, etc.), Online teaching software (Zoom, Teams, etc.), Software (Excel, Stata, MatLab, Python, Photoshop, etc.), Social media (Forum, Facebook, etc.), Web-based tools and media (YouTube, Kahoot, Google Drive, etc.) and Video recordings, streaming, podcasts, etc. To what extent do you experience the following: | | | | | | | | | |
| Digital tools are used in such a way that I am actively involved in class | | | | | x | | | | x |
| The academic staff have the necessary knowledge and | | | | | | | | x | |

| | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|---|-----|-----|--|-----|--|---|
| skills to use digital tools in their teaching | | | | | | | | | |
| I am trained in using digital tools/programmes that are relevant to my subject field | | (x) | x | | | | | | x |
| The use of digital learning platforms works well in my study programme | | | | | | | | | x |
| Overall satisfaction | | | | | | | | | |
| To what extent do you agree with the following statements: | | | | | | | | | |
| I am attending the study programme of my first choice | | | | | | | | | |
| I am, overall, satisfied with the programme I am currently attending | | | | | | | | | |
| Time spent on academic activities | | | | | | | | | |
| Indicate how many hours per week, on average in your study programme this far (not including holidays), you spend on: | | | | | | | | | |
| Learning activities organised by the institution (including all teaching and counselling sessions, plus supervised professional training if relevant) | x | | | | | | | | |
| Independent study (assigned readings, assignments, group work with other students, etc.) | x | | | | | | | | |
| Time spent on a paid job | | | | | | | | | |
| Indicate how many hours per week, on average in your current study programme (not including holidays), you spend on paid work. | x | | | | | | | | |
| Supervised professional training (work placement) | | | | | | | | | |
| Supervised professional training (also known as work placement) is usually conducted at an external workplace, for instance a hospital, school or company (external supervised professional training). Supervised professional training may also be conducted internally at the university college / university, for instance at internal clinics at the institution. The training may be mandatory or voluntary. | | | | | | | | | |
| Have you had supervised professional training organised as part of your study programme? (Yes/No) | | (x) | x | | | | | | x |
| How satisfied are you with: | | | | | | | | | |
| The information you received ahead of the supervised professional training | | (x) | | | | | | | x |
| How the university / university college prepared you for supervised professional training | | (x) | | (x) | | | | | x |
| How well the supervised professional training fit into the programme's study plan | | (x) | | | (x) | | | | x |
| The academic supervision you received during your supervised professional training | | | | | (x) | | (x) | | x |
| What you learnt from your training period | (x) | (x) | | | | | | | x |
| The extent to which the tasks you were given during | | (x) | | | | | | | x |

| | | | | | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----|--|--|--|-----|--|--|---|
| your training period were relevant to your studies | | | | | | | | | |
| How the study programme facilitates reflection around your experiences from professional training | | | | | | (x) | | | x |
| Working life relevance | | | | | | | | | |
| <i>Here we want you to consider the information and the opportunities that are provided by both your study programme and other parts of the institution, such as career centres and student councils. To what extent do you experience the following:</i> | | | | | | | | | |
| I receive useful information about how my skills and knowledge can be used in the labour market | | (x) | | | | | | | x |
| I receive useful information about which occupations/fields are relevant for me | | (x) | | | | | | | x |
| I receive training in how to convey my skills and knowledge to potential employers | | (x) | | | | | | | x |
| Representatives from the labour market contribute to teaching (e.g. as guest lecturers / instructors) | | (x) | | | | | | | x |
| There are possibilities for cooperating with representatives from the labour market on projects / coursework | | (x) | | | | | | | x |
| Learning outcome descriptors - background questions | | | | | | | | | |
| <i>Select the statement that best describes your situation:</i> | | | | | | | | | |
| I was familiar with the learning outcome descriptors for the programme I am currently attending before applying | x | | | | | | | | x |
| I became familiar with the learning outcome descriptors for the programme I am currently attending after being accepted | x | | | | | | | | x |
| I am not familiar with the learning outcome descriptors for the programme I am currently attending | x | | | | | | | | x |
| Have you completed, or are you planning to undergo, a... | | | | | | | | | |
| transfer to a different programme and/or higher education institution (HEI) in Norway? | x | | | | | | | | x |
| foreign exchange programme? | x | | | | | | | | x |
| None of the above | x | | | | | | | | x |
| Learning outcome descriptors | | | | | | | | | |
| <i>To what extent do you agree with the following statements regarding learning outcome descriptors?</i> | | | | | | | | | |
| The learning outcome descriptors are easy to understand | x | | | | | | | | |
| The learning outcome descriptors were a key factor | x | | | | | | | | |

| | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---|--|--|--|---|--|--|--|--|
| in my choice of higher education institution | | | | | | | | | |
| The working life relevance of the learning outcome descriptors was a key factor in my choice of study programme | x | | | | | | | | |
| The learning outcome descriptors for individual courses are clearly tied to the learning outcome descriptors for the study programme as a whole | x | | | | | | | | |
| I make use of the learning outcome descriptors when choosing courses / my major | x | | | | | | | | |
| I make use of the learning outcome descriptors when preparing for exams | x | | | | | | | | |
| The learning outcome descriptors correspond to what I've learned in the courses I have already completed | x | | | | | | | | |
| The learning outcome descriptors are important when transferring to other study programmes / higher education institutions | x | | | | | | | | |
| The learning outcome descriptors are useful when planning (foreign exchange) stays abroad | x | | | | | | | | |
| The learning outcome descriptors are useful when applying for specific recognition of foreign exchange programmes | x | | | | | | | | |
| Teaching and learning methods - usage | | | | | | | | | |
| To what degree are these teaching and learning methods used in your programme? | | | | | x | | | | |
| Teaching and learning methods - contribution | | | | | | | | | |
| To what degree do these teaching and learning methods contribute to your learning? | | | | | x | | | | |

Table 7 shows the total number of questions in the Norwegian national study survey covering each dimension in the model for learning in higher education. From this summary, we see that many of the dimensions are well covered in relation to the learning model. It provides some answers regarding how many participate in learning activities, whether the teaching covers the curriculum well and whether students are satisfied with, e.g., the learning environment and feedback given on student work, as well as their satisfaction related to their learning outcomes. However, with a focus on students' satisfaction, it does not necessarily provide accurate information to the course coordinator and lecturer about the actual learning in the subject.

Table 7. The total number of questions in the Norwegian national study survey covering each of the elements in the model for learning in higher education.

| Student Survey (Studiebarometeret) | Student | Learning objectives | Context | Involvement | Teaching and learning activities | Assessment | Feedback | Change, confirmation and/or comprehension | Assumptions and framework conditions |
|------------------------------------|---------|---------------------|---------|-------------|----------------------------------|------------|----------|-------------------------------------------|--------------------------------------|
| Total number of questions | 41 | 15 | 10 | 5 | 7 | 4 | 17 | 0 | 39 |

ANALYSIS OF TEACHING AND LEARNING IN A MASTER'S PROGRAMME IN RISK AND SAFETY MANAGEMENT

In this section, we analyse the teaching and learning in the master's programme in risk and safety management, to see which elements of the model for learning in higher education are covered and have information collected about them. In this way, we see how the model can also be used to evaluate study degree programmes. As a basis for discussion, some rudimentary information is given for the master's programme in focus. The programme is so-called experience-based, meaning that prior work experience is required for admission, offered at a university in Norway and has a 90-credit workload. It is flexible, in the sense that students may choose to only take courses and do not have to sign up for the full programme.

Activities are set up such that students can combine studying and work. To allow for this, teaching and supervision are organised into five or six full days for a 10-credit course (spread over three sessions). For the remainder of this section, we will present the content of the courses, 'Risk management' and 'Risk analysis', being the two courses discussed in Section 6. The two courses are structured similarly and typically have 20-30 students each.

The courses are structured as a combination of lectures and project work, with the project work intended to cover 25% of the student workload on the course. There is a total of three full days of lectures on the course, covering basic theory. During the lectures, dialogue and student involvement are emphasised. Hence, the students are continuously invited to reflect and share their own experiences on the topics addressed.

Our reflections upon which elements in the model are covered in the master's programme in risk and safety management are given below.

Learning objectives, involvement, context/learning environment

Learning objectives on these courses are relevant knowledge and skills in risk management and analysis. A main principle is that the courses should build on the knowledge and understanding acquired by the students through their work experience.

Teaching and learning activities

The courses start with two days of lectures (session one), in which basic theory is presented. During these days, the students form groups and try to formulate a problem for their project work (as the core is problem-based learning). At the end of each day, the groups spend time with the supervisors to establish a basis for the project work. The group continues working on this for around a month before the next session. Session two is a full day with supervision, in which the groups work together and receive supervision. Note that the groups might also ask for supervision/feedback outside the sessions. Afterwards, the groups have about one month before they must submit their report. This report is presented by the group to the supervisors, with only the group and the supervisors present. In addition, in this third session, there is also a full day with lectures. The oral examination is individual and takes place around three weeks after the third and final session.

Assessment and feedback

Supervision and feedback on the project work are given considerable attention. Several rounds of supervision are scheduled throughout the course, in addition to voluntary extra supervision for those groups who ask for it. The students also receive feedback on basic theory questions they might have. During supervision, the students receive feedback on the work they have conducted so far and on what can be improved. The emphasis is on helping students reach a deeper understanding, for example through supervisors asking questions to encourage critical thinking and reflection.

In the oral examination, students are asked questions to test their basic theory knowledge and deeper understanding. Students are evaluated based on a combination of written work and the oral examination, with the project work counting for 25%. In the final session, after their presentation of the project work, students receive oral feedback on the report and presentation. They are awarded a specific evaluation and grade for this work, given to the group as a whole.

Change, confirmation and/or comprehension

Through communication with the supervisors, who focus especially on giving feedback on what the students have got correct (i.e., confirmation) and what they need to improve (i.e., change), the groups acquire understanding of what works and how to address relevant problems within the discipline. They also learn from each other, share experience and contribute to a common product, as well as building on the theory acquired from lectures and the curriculum. The point is to have them apply theory in practice – to apply it, rather than summarise or repeat this in a report. This theory processing makes the students identify various benefits and challenges for themselves and places them into their own context and use, thus contributing to a deeper understanding (i.e., comprehension).

Assumptions and framework conditions

Students' learning related to the project work builds on the premise of motivated students and that they spend time on their studies. The motivation could obviously influence the group dynamics if someone is unwilling to contribute or expresses discomfort with the group. The situation is the same if someone is not able or willing to spend time on the work and acts as a passive member of the group. For these courses, the total workload is estimated at around 250 hours. It is assumed that the university has ensured enough resources to prepare and carry out lectures and to give the necessary supervision and feedback to the students.

Course evaluation

After each course, students receive a questionnaire, in which they can give their input for evaluation of the course. This is sent out electronically, and students can give their opinion on how satisfied they are, what they think is good/not-so-good and how the course could be improved. There is also dialogue with students during the course, to capture whether there are things to adjust along the way. As pointed out in Section 4, we have seen that there is little help in the different forms used, which is the basis for the university's internal quality system for education, when evaluating students' learning. They provide limited help and limited information, which means that it is up to each course coordinator and lecturer to collect any additional information in order to make an evaluation of the learning on each course.

DISCUSSION – USE OF THE LEARNING MODEL FOR ANALYSIS AND EVALUATION

The model pinpoints the basis for learning on courses and points to aspects that are important for evaluation and continuous student learning. As such, the model can be seen as a starting point for considerations around how the current design contributes to student learning. The model can be used to identify challenges and potentials for improved learning. In the discussion below, course-specific details are omitted, as our primary focus is on the learning aspects covered by the model.

Learning objective, involvement, context/learning environment

The potential for improved learning needs to be seen in relation to the achievement of learning objectives. The objectives influence course design and consequently influence the learning environment. Hence, objectives should be appropriate and regularly revised. The lecturer has a responsibility here, but it is important that other actors are also invited to give inputs to the revision work, for quality assurance.

Teaching and learning activities

For teaching and learning activities, the focus is on course design and how it works in practice. To be more specific on this, we refer to data collected during the autumn of 2019. A questionnaire was completed by 45 students from industry and public sector contexts about how different activities influenced their learning capabilities; see Table 8. The percentage shows how the students, if they were given full flexibility regarding the course, would like to distribute the time (250 hours) they spend on the course.

Table 8. Results, data collection 2019 (n=45): Student opinion on optimal distribution of course time

| Activity | Avg. percentage of time |
|----------------------------------------------------|-------------------------|
| Attending lectures in classroom | 24 % |
| Use of video lectures | 10 % |
| Project work and reporting | 14 % |
| Use of e-learning modules | 9 % |
| Participating in discussions in the classroom | 6 % |
| Participating in discussions outside the classroom | 4 % |
| Reading literature (textbook/curriculum) | 17 % |
| Preparing for exam | 17 % |
| Sum | 100 % |

The distribution gives students' opinions on which activities are best for learning, i.e., how they best achieve the learning objectives. Obviously, there is some variation among students, as they typically have mixed experience regarding what works, besides having varying bases and ambitions for the course. This influences both what they want to achieve and whether they are willing to do what it takes to get there. Here, already at the beginning of the course, there could be a mismatch between the expectations of the lecturer and the students. For example, the project work plays a main role in the design of the course and counts for 25% of their final grade. However, from Table 8, it seems that this is not an activity valued highly by the students. Obviously, project work requires participation and involvement. Students trying to minimise their efforts would most likely have reduced learning benefits from learning activities such as project work. It also depends on how they perceive the quality of these activities on the course they have attended. For example, if they have been in a strong project group, this might make them more positive towards such an activity. Nevertheless, there could also be a gap between what is preferred by the student and how the lecturer concludes regarding what benefits learning, for example, when being asked for the benefits of project work, specifically, the students score this somewhat low. However, the lecturer might claim that this is not necessarily because of the benefits but because it is more motivating or convenient for the student to sit in a classroom listening to the lecturer than to have to work on solving a project in a group. For the lectures, as Bain (2014) claims, it matters greatly how the lectures are carried out – a lecture that raises interesting and relevant questions and then helps students to think and gain a deeper understanding will contribute to good learning. A key is to understand mechanisms and what works for the students.

Problem-based learning has a strong focus on student involvement, interactions between the students, ownership and responsibility (English & Kitsantas, 2013; Steinemann, 2003), with students being expected to take a more active role. But not all students might be ready or prefer to take such a role. Hence, the lecturers must pay attention and, if necessary, take action to ensure that students have equal opportunities and bases for learning, so that the learning objectives are achieved by the individual students and not just by the project groups. Particularly, if there are students with high ambitions, setting goals that are too high or too low could make them feel a sense of failure and thus unmotivated to complete tasks (Sternberg & Williams, 2002).

Further, students should interact with other students and lecturers and spend time reflecting on the experience acquired (see Kolb, 2015; Schön, 1983). In literature, the importance of the repetition of content previously lectured on is pointed to (Tafreschi & Thiemann, 2016). Repetition is a way to highlight key parts of

the curriculum and to strengthen the reflections. It is part of cognitive processing: to remember better, but also for better understanding, for example, by having the content presented from a different perspective or making the students present it in their own words. Biggs and Tang (2011) suggest that formative feedback can benefit students in this process.

Assessment and feedback

Both project work assessment and final examinations build on the premise that they will test the achievement of learning objectives. However, students may be motivated in different ways. The way in which they are motivated plays a role in students' interest in the feedback and in learning effectiveness (Cerasoli et al., 2014). Strongly focusing on scoring well in the examination constitutes an extrinsic motivation, and such students might not focus as much on learning according to the full scope of the course. Zaccone and Pedrini (2019) have analysed empirical data on the issue and conclude that intrinsic motivation has a more positive effect on learning effectiveness, compared with extrinsic motivation. This emphasises the importance of alignment between learning objectives, teaching/learning activities and assessment (Biggs & Tang 2011). This is also indicated in their study, in which a marginally higher percentage is given to preparing for exams compared with project work.

After the examinations, students receive the examiner's guidance, showing what is expected for full marks (i.e., the solutions to the problems). The students should use this for learning. It gives them indications of where there are gaps in knowledge and skills.

Change, confirmation and/or comprehension

Feedback can give students valuable insights, although this depends on how it is given (Winstone & Carless, 2019; Hattie & Timperley, 2007). Studies by Hattie (2011) and Kluger and DeNisi (1996) suggest that feedback under given conditions can have a minimal or unwanted effect on performance. Nevertheless, feedback could support students with relevant information on where they stand in regard to their work, such as feedback underlying project work score, complemented with an evaluation of their basic theoretical knowledge – being the foundation for the course and project work – such that there is a basis for improvement and a deeper understanding. But, as indicated above, this requires feedback with quality.

The examination feedback also gives some indication to the lecturer regarding the quality of the course design. If many students perform poorly, question the evaluation or file complaints, this might call for reconsideration of the course design.

Assumptions and framework conditions

That students spend time on the courses is often seen as a key to in-depth learning. However, it does not matter how well the courses are designed, if students are not spending time or doing what is required to achieve the learning objectives. Students can be informed about what is expected of them; however, there might be personal circumstances making it difficult to meet these expectations. For example, they might have other commitments limiting their availability and their ability to contribute to the learning environment, such as paid work or other courses that they attend. The same goes for the lecturers, who might have a time budget, limiting the time to spend on supervision, which might influence flexibility and quality.

Classroom design and digital opportunities and requirements could play a role in student activity and learning environment. A digital arena might, for example, pose a challenge for students to establish project groups with good dynamics. We refer to Morrison and Camargo-Borges (2016), for further discussions on the opportunities and challenges related to digital learning environments.

Course evaluation

After the courses are completed, students are encouraged to give input for evaluation purposes. This feedback is valuable to the lecturers, for example for the design and preparation of future courses, but many

students do not see the value of this and fail to give appropriate feedback. If only a few students submit their opinions, then the course's adjustment might be misguided and lead to changes that do not favour learning for students on future courses.

Adjustment of courses might also be misguided if the course evaluation does not collect information about factors important for learning. The evaluation questionnaires and report templates used by the university to evaluate teaching and learning are insufficient, leaving it up to the individual lecturer to collect any additional information about their teaching and students' learning. This is not a viable approach, as teacher education appears not to focus on the development of evaluation skills for teachers (cf. McFadden & Williams, 2020). A predefined evaluation questionnaire or report template would therefore be helpful. However, a prerequisite for this, to aid teachers, is that the questionnaire/template is designed in accordance with factors important for teaching and learning, thus aligning measurement approaches with the conceptual understanding of teaching (cf. White et al., 2022). The model presented in this paper may be a promising alternative to use as a basis for describing, analysing and evaluating learning in higher education. Further, the Norwegian national student survey covers the factors in the model in a suitable way, enabling the collection of necessary information about teaching and learning, but needs to be used on each course to give the full benefit. An evaluation questionnaire or report template based on the model developed will also be helpful for institutions, as it will enable universities to evaluate teaching quality more objectively (cf. Wang & Williamson, 2022) and obtain a quality system that produces knowledge about the mechanisms that hinder and promote learning (cf. Gynnild, 2007), in addition to evaluating teachers' employee performance (cf. Lohman, 2021).

A final note regarding the questionnaire. This was given to students after completion of the course and covers the full population, i.e., the two courses (n=45). This makes the feedback representative, in terms of their experiences on these, but this is not normally the situation when receiving evaluation scores from students. Especially when only a fraction of the students submits their scores, there is a challenge in assessing whether the feedback represents the general opinion in the class. For the questionnaire, the students were asked to fill this out on site, anonymously, which is the main reason why so many completed it. Besides, as overall student satisfaction on the courses was quite high, there is a possibility that students had a positive attitude towards the current design when giving their answers.

CONCLUDING REMARKS

The model presented is relevant for describing, analysing and evaluating learning in risk management education, with a focus on experiences from a master's programme in risk and safety management at a Norwegian university. The model is holistic and student-centred and particularly highlights the role of reflection in the learning process. Reflection is seen as essential for in-depth learning, just as in the emergency response context. It builds students' ability to develop knowledge and skills from the experiences collected through participation in various learning activities. Appropriate learning activities must thus be tailored such that students are able to achieve the intended learning objectives. To support this tailoring, we refer to aspects emphasised in the literature as important for learning in higher education, such as constructive alignment, the necessity of student engagement and activity, giving formative feedback to students, and frame conditions provided by the teaching institution, as well as aspects not addressed. The model adds to existing literature by representing a suitable frame for how these aspects interact and influence learning. It can be used to achieve course designs and learning environments in which both social and individual learning approaches are considered.

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