Simulation as a Pedagogical Method for Developing Pre-Service Teachers' Suitability – A Collaborative Pilot Study

Mette Hvalby, University of Stavanger & Mette Tindvik Hansen, Ostfold University College

INTRODUCTION

In Norway, 28 higher education programmes continuously assess the suitability of their students. Suitability assessment is a stamp of quality in higher education, and an assurance that the students are qualified for professional practice.[1] The definition for the assessment is stated by national regulations, in which consist of eight criteria related to the students' abilities and willingness to practice a future professional role.[2]

In higher education, the use of simulation-based learning (SBL) is well documented in research related to nursing, nursing in social education, and several other social studies.[3] To enhance the pre-service teachers' professional development, SBL is also being integrated into teacher education.[4] This pilot study is based on a collaborative project between teacher education at one university and nursing in social education at a university college, where systematic simulation-based training was facilitated in a teacher education programme. The simulation exercise was developed and tailored to the pre-service teachers' needs involving the criteria related to suitability assessment and the learning outcomes. Additionally, authentic cases were created by mentor teachers, so the participants could practice professional skills, thus increasing the applicability of theoretical knowledge in practical situations. Furthermore, one of the researchers had competence and experience from nursing in social education including research simulation, whereas the other researcher had scientific and educational experience and competence from teacher education programmes. Bringing different skills, perspectives, and competence together cross-domain and cross-institution can be challenging when creating a common understanding of a phenomenon.[5] However, complementarity is adding value to interdisciplinary research and teaching,[6] and both the researchers were heads of suitability assessments in their institutions and shared similar attitudes and learning outcomes related to suitability assessments.

The data collection was conducted using a questionnaire to map the pre-service teachers' perceptions of self-awareness pre- and post-simulation. Furthermore, focus group discussions with the participants were performed after the simulation, and data of the pre-service teachers' immediate experiences from the activities were collected to highlight the research question: *How can simulation as a pedagogical method contribute to strengthen pre-service teachers' self-efficacy and suitability?*

PREVIOUS RESEARCH

Suitability assessment is a sensitive and abstract concept revealing whether the pre-service teachers have the prerequisites needed for being able to practice the profession. The criteria in the National Regulations are included in the learning outcomes and are related to the ability and willingness to

communicate and collaborate, to care and facilitate learning for pupils, to create a positive learning environment, to take responsibility as a role model, to change unacceptable behaviour in accordance with the mentoring, and to show self-assessment related to a future professional role. [7] However, the vulnerability related to each individual's suitability makes it difficult to create a clear construct needed for the assessment.[8]

There is limited published research connected to the processes of suitability assessments.[9] Nevertheless, some studies have found that there is difficult for the actors to navigate in this landscape. [10] Explicitly, this can be related to the use of the assessment criterion, which often becomes subjective and is based on professional judgement.[11] Furthermore, suitability assessment presents both professional and ethical challenges when professional development also includes suitable behaviour and attitude, which is measured in the students' abilities and willingness. Becoming suitable for the profession is a process, and the practices of suitability assessment require to be understood taking its context into consideration. [12]

SBL allows students to practice complex skills in higher education in a safe environment and has become an approved intervention to bring congruence between theory and practical learned skills.[13] Furthermore, different frameworks can facilitate SBL during different phases of the development of knowledge and skills, and recent research shows that simulation as a pedagogical method can have an impact of initial emotional states and self-efficacy changes amongst Nurses (RNs) and Intellectual Disability Nurses (IDNs). [14]

THEORETICAL PERSPECTIVES

Metacognition in accordance with Deanna Kuhn [15] is 'thinking about one's thought', which involves the perceptual process of being able to plan, monitor and access stored knowledge and use this when performing. Metacognition in a socio-cognitive framework includes that the person will be 'using regulative thoughts to guide action and self-reflective thoughts', which represents separable levels and cognitive control.[16] Furthermore, reflection is the metacognitive thinking in- and on- action related to own practices, which involves the improvement of skills and professional development. [17] A person mastering metacognition will have the prerequisite needed to perform critical thinking, referring to opinions and views not being indifferent, which involve testing by confronting these perspectives with counterarguments and alternative solutions. [18]

Albert Bandura [19] claimed that 'self-efficacy is one's belief in how well they can deal with prospective situations, thus determining the efforts and persistence that an individual would exert when facing obstacles.' Further, a person's perceived self-efficacy refers to one's beliefs in their capabilities to organise and to execute the action required to manage a given situation. [20] There will always be implications that can affect the person's ability to execute actions, such as affective states that impact the motivation level at any given time, and low perceived self-efficacy can be related to emotional security and stress. Bandura [21] referred to four main sources for enhancing a person's self-efficacy: 1) mastering experiences, which can be exemplified as achieving learning outcomes, 2) vicarious experiences, which may refer to observing peers achieving common learning outcomes, 3) social persuasion, that can involve being verbal persuaded by peers and teachers, and 4) a positive emotional and physiological state of mind.

Teacher self-efficacy for classroom management is a basic element of professional teacher identity, which affects the quality of teaching. [22] Conflict management strategies contribute to developing self-

efficacy and are related to behaviour and attitude fostered in a conflict context. [23] The strategies involve how teachers can approach pupils using communication techniques and emotional skills. Simulations facilitate the context where cognitive knowledge can be transformed into operational knowledge [24] and provide opportunities for developing communication and emotional skills, in addition to behavioural and attitudinal changes. [25] In simulation, it is required that the participants engage in professional reflection related to teacher practice, which further can strengthen the perception of self-efficacy. [26]

METHODOLOGY

The pilot study was designed with a mixed method approach involving both quantitative and qualitative data collection [27] to enable sufficient depth and breadth when answering how simulation as a pedagogical method can contribute to enhancing pre-service teachers' self-efficacy and suitability.

The Sample

To increase the credibility of the study, a detailed and transparent description of the research process is required. Criterion sampling [28] was conducted when an invitation with information was sent to all pre-service teachers studying in their first year at one university to become primary school teachers. 72 pre-service teachers mixed in gender, age, and experience in teaching accepted the request to participate in the research project and were randomly placed in 19 focus groups. Furthermore, these groups were constant during the simulation and the interviews. However, the participants responded individually to the surveys. The project was granted approval by The Norwegian Agency for Shared Services in Education and Research.

The Simulation activity

The simulation was designed and performed in agreement with the Standards of Best Practice: Simulation Standard IX: Simulation Design, [29] and consisted of the following 11 elements:

1. A needs assessment, which provided the evidence required for a well-designed simulation, and included an evaluation of knowledge and skills of pre-service teachers related to suitability assessment. The results addressed the identified needs to promote readiness for practice and for a future professional role.

2. Measurable objectives, which were related to both organizational goals and the performance of the participants. The eight criteria in the Suitability Regulations were made available to the pre-service teachers before the simulation. Furthermore, general information and context for the activities were revealed. The description of the simulation is illustrated in Table 1, whereas the eight criteria are showed in Table 2.

Situation	Required action	Expected outcome
Case 2 **Pupil Andre,** **5th class**	Ask how the pupil is doing and maintain the conversation. Use techniques from classroom management theory. Round up the conversation when the	Knowledge: Being able to identify the pupil's reactions Being able to identify professional ethical dilemmas

	pupil calms down or responds to the techniques.	Skills: Being able to use acquired skills in a classroom situation

Table 1. *Description of simulation*

3. The format of simulation, which had the purpose of providing a formative and summative encounter with the concept suitability assessment, was initiated by a scientific article about the topic. In addition, a lecture about suitability assessment in teacher education was conducted. The modalities included structured simulated cases with unfolding scenarios, designed for the pre-service teachers to engage. One of the cases are exemplified in Table 2.

4. The scenarios and cases were developed and provided the context for the simulation. Furthermore, the situation involved an authentic starting point in the classroom where the structured activity started. The time frame was 6 minutes, and one of the participants made sure time was kept. Furthermore, cues were delivered to the pre-service teachers verbally through the pupil and there was pointed out that too much improvisation from the planned dialogue could cause distraction which might have interfered with the learning objectives. Evidence-based performance measures were conducted by teacher educators, who were subject matter experts, to strengthen the validity. The template scenario is illustrated in Table 2.

Target group	Pre-service Teachers, first year in Teacher Education	
Theme	Suitability Assessment	
Learning outcomes	**a**. The student demonstrates a lack of willingness or ability to care for and to lead learning processes for children, adolescents, and adults in accordance with goals and guidelines for kindergarten and school activities. **b**. The student demonstrates a lack of willingness or ability to have an overview of what is going on in a group of children or a class and from this create a learning environment that takes include the safety of children, adolescents and adults and their mental and physical health. **c.** The student fails to take responsibility as a role model for children, adolescents, and adults in accordance with the objectives and guidelines for kindergarten and school activities. **d.** The student demonstrates an unwillingness or ability to communicate and cooperate with children, adolescents, and adults. **e.** The student has problems of such a nature that they are unable to interact in relation to their surroundings. **f.** The student demonstrates inadequate self-awareness in connection to the tasks required within the educational program or in a future professional role.	
Based upon	Lecture:	Literature:
	What is Suitability Assessment and how are you as students in Teacher Education evaluated according to Suitability Assessments	National Regulation on Suitability Assessment in Higher Education. Article "Professional Judgement in Suitability Assessments" [30]

Time frame	**Briefing:**	30 min	**Simulation:**	20 min x 4 scenarios	**Debriefing:** 5 min + 45 min	
Case	How to communicate with and to reassure the quiet and underachieving pupil? Andre is a 10-year-old boy who is attending the 5th class with 18 other pupils. In the past, you have noticed that he seems shy and a little insecure. In this lesson he sits and cries quietly at his desk. How can you get his attention, reassure, and show that you care? And what about the teaching of the rest of the class when you are preoccupied with one individual?					
Student roles	1 Teacher		2 observers		1 Teachers Assistant	
Reflection	15 minutes after every scenario					
Designer scenarios	XXX					

Table 2. *Template scenario*

5. Physical, conceptual, and psychological fidelity involved factors that replicated the environment in which the situation would occur in real life, including an equipped classroom with related props and a pupil. To design the perception of authenticity, the scenarios were reviewed by subject matter experts and pilot tested before the simulation. Moreover, psychological fidelity promoted the pre-service teachers' engagement by adding distractions, addressing other pupils, and competing priorities in the simulation.

6. The facilitators approached the simulation based upon the objectives, the pre-service teachers' knowledge and level of experience, and the expected outcomes. The pre-service teachers played the key role, however, the facilitators also participated in the simulation transforming into the pupil in the activity. When managing the simulation, the facilitator met ethical challenges, and for maintaining appropriate standards formal training in simulation-based pedagogy should be required by all the facilitators involved.

7. Briefing is a structured fundamental part of the simulation, which involves founding of ground rules. First, a written briefing plan, which described the process and content for each scenario became available on the pre-service teachers' online learning platform the week prior to the simulation. Furthermore, briefing was conducted in a lecture including orientation of the classrooms, simulation as a pedagogical method, the objectives, the roles, time allotment, and evaluation method. In addition to the instruction, the pre-service teachers and the facilitators shared their expectations. Moreover, briefing was completed immediately before the scenarios emphasising the need of trust and respect in the activities.

8. The purpose of the planned debriefing session is to strengthen the learning, which is prepared by the facilitators, who use debriefing techniques. The pre-service teachers were asked to share their experiences before they were given structured and direct feedback that intended to contribute to development or confirmation of their practice. Furthermore, the pre-service teachers were asked to reflect upon and discuss their actions in the skill-based simulation. They were also encouraged to talk about their experiences of classroom management related to suitability, in addition to their perceptions about self-awareness.

9. Evaluation of the participants and the facilitators involves a valid tool, which measures outcomes to ensure quality in the simulation. Fellow students were peers and provided valuable input from the evaluation framework, measuring 25 statements on a seven-point Likert scale.

10. Participant preparation should include activities that address the knowledge, skills, attitudes, and behaviours that are expected of the participants during the simulation. Several activities related to the concept of suitability were included in the preparation, like reading assignments, didactic sessions, and answering suitability-specific questions. However, these activities were not related directly to the concept of simulation. Nevertheless, the pre-service teachers were informed concerning codes of conduct, confidentiality, and expectations.

11. Pilot Testing of the simulation-based experience ensure that the activity meets the objectives, and some underdeveloped elements were identified during this pilot including the use of the evaluation tool, and measures to assess for validity. Furthermore, the need for potential changes were discussed.

Data collection

The quantitative data collection consisted of four data sets, where three were used in the analysis, and one was excluded due to lack of validity.

The following three surveys were included in this pilot study:

1. Identifying stress. Prior to simulation a questionnaire was completed to identify psychological indicators of stress. The indicators in the questionnaire are identified in international literature. [31] The questionnaire consisted of 14 stress indicators presented to the respondents using a Likert scale 1–7, where 1 = totally disagree, 2 = disagree, 3 = partly disagree, 4 = neutral, 5 = partly agree, 6 = agree, and 7 = totally agree. The stress indicators were dry mouth, increased heartbeat, increased pulse, perception of non-existent noise, temporarily speechless, feeling of 'having' butterflies, nauseous, tunnel vision, lack of fine motor skills (movement in fingers and hands), experiencing time passed slowly, chills, lack of hearing, reduced capability of controlling movement, and muscle tension.

2. Identifying personal skills of de-escalating communication. The questionnaire consisted of 10 symptoms representing skills of de-escalating communication. [32] The respondents were asked to score according to feedback from peer students and the experts (here pre-service teachers) presented to the respondents using a Likert scale 1–7. The scale where 1 = totally disagree, 2 = disagree, 3 = partly disagree, 4 = neutral, 5 = partly agree, 6 = agree, and 7 = totally agree.

   The skills represented in the respect of distance and proximity, keeping same physical hight as the other, do not 'corner' the other, positioning myself and making sure there are escape routes for both involved, avoiding unnecessary gesticulation, avoiding dominating body language, avoiding excessive eye contact, congruence in language, using an easy and informal language, giving the student time to comprehend the given information, and repeating important information.

3. Expert-rated performance, feedback from the 'experts' (here 4 mentor teachers holding the role of markers and facilitators in debriefing). This questionnaire was based upon the observation of the teacher role in simulation, regarding skills in de-escalating communication. Assessed post simulation on a 10-point Likert-scale ranging from 0% to 100% (in 10% increments). There were 4 scenarios with 4 presenting 'teachers', thus there was a total of 16 expert feedbacks.

To highlight the research question, the first survey had one open-ended question asking the respondents to describe their perception of self-awareness prior and post simulation. In addition, the data collection was based on 19 qualitative focus group discussions with pre-service teachers after the

simulation to gain insight into their experiences related to how simulation as a pedagogical method can contribute to strengthen self-efficacy and suitability. The pre-service teachers were interviewed in the group in which they conducted the simulation. We chose to perform several focus group discussions with few participants rather than individual interviews, considering the purpose, which was to facilitate sharing of experience and exchange of opinions, as well as to enable a calibration of the participant's statements with a view to a common understanding.[33]

The questioning route was semi-structured, and the pre-service teachers were asked questions related to their recent experiences in the simulation. Furthermore, they were encouraged to discuss their understanding and learning from the activities. Finally, the participants were asked questions involving suitability and self-awareness.

One of the data assessments, the 'Critical Thinking Disposition Scale'[34] was discarded due to a conflict of validity. Some changes were tried, adjusting from a 7-point Likert scale to a 4-point Likert scale. We see that using the validated 7-point Likert-scale 'Critical Thinking Disposition Scale' would have provided more accurate and enabling necessary nuances in the respondents' perception. The evaluation of the pilot study requires some changes in the data collection, which will be developed and explored further in a larger scale research project.

Analysis surveys

Statistical analysis was conducted upon the quantitative data, using SPSS Version 28.0.1.0 (IBM Corp, 2023). Further, the study employed a descriptive statistic approach in analysing data presenting population (*N*), range, maximum- minimum, mean (*M*), median (*Mdn*) and standard deviation (*SD*).

The last question in the first survey was open-ended and requested the pre-service teachers to describe their perception of self-awareness. In the analysis, these qualitative data were openly coded, and the findings were thematised in categories, which revealed differences in the data before and after the simulation. Overall, prior to the simulation the respondents' perception of self-awareness were descriptions of their shortcomings in the professional role. The term 'mistake' was most frequently used, and one respondent pointed out: "Self-awareness is when I discover my own mistakes in my doings." However, findings in the responds after the simulation showed the pre-service teachers' perception of developing self-awareness as a process involving reflection and critical thinking. This is illustrated in the following quote: "The ability to see myself in relation to others concerns self-awareness. This process involves being outside my comfort zone, reflecting, considering other perspectives, and being critical and open to change."

Analysis focus group discussions

This study applied Moser and Korstjens[35] approach to inductive thematic analysis of the transcriptions in three stages: 1) arranging the data and searching for codes, 2) finding themes and patterns, and 3) recognise major themes through interpretating the results. First, the participants' narratives were highlighted, including their descriptions of own experiences when conducting simulation. This involved the actual simulation settings, which indicated how the pre-service teachers experienced the exercise and what didactic choices they made in the communication. The participants' statements were openly coded.

Second, we explored the data from the focus group discussions organising a search for themes and patterns relevant for the research question. Third, an extensive approach was made, engaging a complete reading from the earlier stages of the analysis related to the data and the research question.

Furthermore, the analysis process was corresponding between the three stages comparing our interpretation to the responses from the survey and the focus group discussions, hence new knowledge was constructed. To perform triangulation, [36] key findings from all the data sets were sorted and similar main findings were grouped. The analysis indicated coherence among the pre-service teachers' responses in the surveys and in the focus group discussions, and the grouping of findings revealed three major themes: 1) stress management, 2) conflict management, and 3) contextualization in teaching.

Ethical considerations and trustworthiness

The ethical considerations of the study followed the principles of the National Committee for Research Ethics in the Social Sciences and the Humanities,[37] which related to consent, privacy, and confidentiality. The simulation was created to resemble authentic professional teacher practices, in which the pre-service teachers needed repeatedly practicing in how to handle and solve rapid and unpredictable situations. Some participants were uncomfortable and showed vulnerability in these situations, which required a safe environment where the pre-service teachers were assured that their boundaries would not be crossed. At the same time, it cannot be ruled out that some of the participants felt more challenged than others in these sensitive settings, depending on each pre-service teacher's prerequisites to become a teacher. Furthermore, the Head of suitability assessment's presence in facilitating some of the focus group interviews should be addressed. Even though there was a strive for trust, recognition, and reducing the imbalance in power, there is a possibility that some participants were influenced by the Head's attendance, which may have had an impact on their discussions. On the other hand, the presence of the Head may have provided a safe setting for learning and an arena where the pre-service teachers could communicate with the Head for guidance and advice related to suitability.

RESULTS SURVEYS

A total of 72 pre-service teachers participated, in which 39 contributed into this study (N=39), 9 men and 30 females. Of the respondents, 19 pre-service teachers were above 25 years, and 20 pre-service teachers were belove 25 years of age. 13 respondents reported that they had experience from either working in or attending practicum studies at schools, none of these were registered as certified teachers. One third (13) of the pre-service teachers registered that they had previous experience with simulation as a pedagogical method.

1. Identifying psychological indicators of stress (N=36-39).

Analysing the data collected we found that most of the respondents did not experience indicators for stress during the given simulation intervention. Median (*Mdn*) in this data set overall being 4. Mean (*M*) ranging from 1,28 (indicator 'lack of hearing') to see a slight indication for the stress indicators such as present such as increased pulse (*M* 4,05) and experiencing time passed slowly (*M* 4,13), although neither with a significant number. The Standard Deviation (SD) being high indicates a large spread and variation in the registered data, meaning that respondents' registered data is greatly spread upon the Likert-Scale (see Table 3).

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Dry mouth	39	6	1	7	2,56	1,744
Increased Heartbeat	39	6	1	7	2,97	1,678
Increased pulse	39	6	1	7	4,05	1,746
Perception of non-existent noise	36	6	1	7	1,42	1,156
Temporary speechless	38	6	1	7	3,05	1,754
Feeling of 'having butterflies'	38	6	1	7	2,50	1,767
Nauseous	39	6	1	7	1,41	1,292
Tunnel visjon	39	6	1	7	1,54	1,374
Lack of fine motoric skills (movement in fingers and hands)	39	6	1	7	1,69	1,360
Experiencing time going bye slower	39	6	1	7	4,13	1,922
Experiences Chills	39	6	1	7	1,46	1,189
Lack of hearing	39	6	1	7	1,28	1,146
Reduced capability of controlling movement	39	6	1	7	1,41	1,093
Experienced muscle tension(s)	39	6	1	7	2,41	1,817
Valid N (listwise)	34					

Table 3. *Identifying psychological indicators of stress*

2. Identifying personal skills of de-escalating communication (N=37-39).

Using a 7-point Likert-scale facilitated a potential Range of 6, a *Mdn* of 4, and the *M* of 4 for all questions. The data registered gives variation upon the *M* of in some of the variables. The variation in M ranging from 4,41 on the question where respondents self-reported if they were repeating message to ensure confirmation upon the pupil understanding given information, to 5,79 on the question regarding the respondent's ability to respect distance and proximity in collaborating with the pupil. In general, all the variables in this assessment scored a high *M*. The two questions representing the highest *M* also had the lowest spread in Rang. The variable scoring the highest *M* had a range of 4, then the variable scoring second to the highest *M* had a range of 5. Furthermore, the data set provide a high *SD* on all the questions, showing a large spread amongst the selected variables, with each individual question and on a general level (see Table 4).

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Respect of distance and proximity	39	5	2	7	5,79	1,321
Keeping same physical hight as the student	39	6	1	7	5,21	1,908
Positioning myself and making sure there are escape routes for both involved	39	6	1	7	5,49	1,636
Avoiding unnecessary gesticulation,	37	4	3	7	5,89	1,173
Avoiding dominating body language	39	6	1	7	5,74	1,860
Avoiding excessive eye contact	37	6	1	7	5,57	1,591
Congruence in language	39	6	1	7	5,49	1,502
Using an easy and unformal language	39	6	1	7	5,69	1,608
Giving the student time to comprehend the given information	39	6	1	7	5,10	1,729
Repeating important information	39	6	1	7	4,67	1,611
Repeated message to insure confirmation upon the student understanding of given informasjon	39	6	1	7	4,41	1,943
Valid N (listwise)	36					

Table 4. *Descriptive statistics Identifying personal skills of de-escalating communication.*

3. Expert feedback (N=16):

The Expert feedback assessment rating the 16 respondents who were given the teacher role in the simulation intervention had a potential *Mdn* of 5, and potential *M* of 5,5. The potential Range was 10 given that the assessment was presented on the 10-point Likert-scale. The assessment rating, however, scored no lower than 4 on the Likert-scale, giving a great reduction of the Range from 10 to 6. The adjusted *Mdn* for the assessment becoming 7, and the *M* becoming 7 for the two variables "To what level did the teacher identify the pupils needs?" and "To what level did the teacher practice skills in de-escalating communication?". The *Mdn* for the last variable "How well did the teacher perform customized communication with the pupil" becoming 7,5 and the *M* becoming 7,5. There is no discrepancy from the *Mdn* and the *M* indicating a symmetrical distribution of the scoring. Here a high *SD* shows a variation in range on the plotted of data on the individual scores on the Likert-Scale (see Table 5).

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation
To what level did the teacher customize his/her communication towards the pupil?	16	5	5	10	7,75	1,342
To what level did the teacher identify the pupils needs?	16	6	4	10	7,25	1,612
To what level did the teacher practice skills in de-escalating communication?	16	6	4	10	7,25	1,915
Valid N (listwise)	16					

Table 5. *Descriptive statistics Expert feedback*

DISCUSSION

In this section, the qualitative findings of the analysis, illustrated in Table 6, are presented, and discussed in light of the quantitative results, and the theoretical perspectives related to teacher self-efficacy.
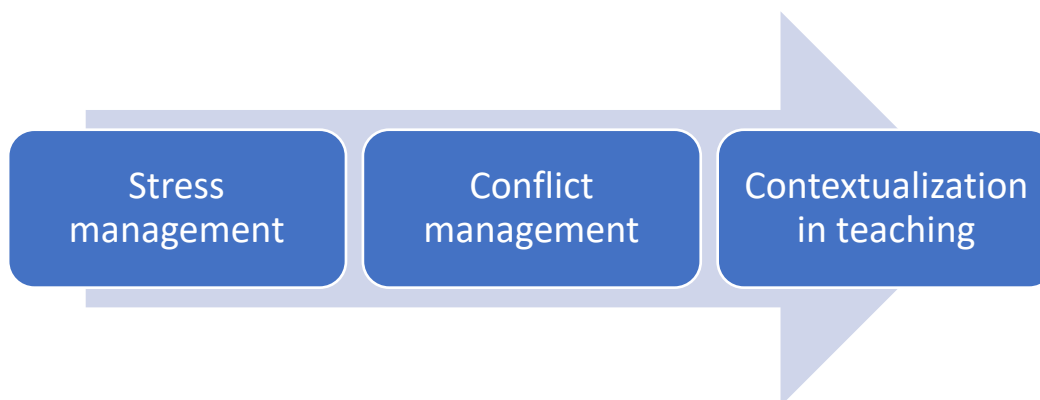

Table 6. The three major themes related to the pre-service teachers' process of developing teacher self-efficacy and suitability through simulation.

Stress management

The first major theme described the pre-service teachers' attitudes and behaviour when they practiced the professional role in the simulation. Several of the participants addressed realistic situations, where they had prepared for making different didactic choices during the exercise and most of the pre-service teachers identified stress-related symptoms like increased pulse and sensing that time passed slowly. Pre-service teacher 5 expressed: "It was a strange feeling to face stress, although I was aware this could happen." However, the findings in the focus group discussions revealed that although the participants occasionally were out of their comfort zones, most of them did not become overwhelmed. Pre-service teacher 12 pointed out: "I think stress can have a positive side, keeping me on the alert."

There was coherence in the results from the survey identifying psychological indicators of stress, and these experiences of managing stress may have had positive impact on the pre-service teachers' ability to enhance their self-awareness, because a positive emotional and physiological state of mind is a source for strengthening self-efficacy. [38] On the other hand, low perceived self-efficacy can be related to negative stress and emotional security, and for some of the participants the experience of stress-related behaviour appeared in the responses. Other issues in the findings were the differences among the participants concerning what role they simulated, whether it was the teacher or the assistant, and moreover, the impact of the peer-support in each team.

Finally, knowledge of the exercise needs to be taken into consideration, hence enabling to judge self-efficacy to a related task requires to know what the task demands. [39] For the pre-service teachers to judge their capabilities required adequate knowledge of the simulation,[40] and one third of the participants had previous experience with similar settings. Additionally, by following the standards of best practice, [41] it was facilitated for the participants to gain insight into the topic prior and during the simulation activities.

Conflict management

The second major theme involved handling tense situations using de-escalating communication skills, and the simulation intended to facilitate possibilities for developing techniques. [42] Few of the pre-service teachers doubted their skills, and these participants' perceptions of self-awareness prior to the simulation was related to failing in their professional action. Pre-service teacher 9 revealed: "It was difficult to face the pupil's problem head-on and to solve it."

Nevertheless, most of the participants expressed managing de-escalating communication and they achieved their learning outcomes. All the pre-service teachers experienced to get encouraging feedback from peer students and teachers and their self-doubt gradually decreased, hence, they started to emphasise on their capabilities. This is in line with social persuasion, [43] which in these situations involved receiving verbal support convincing the pre-service teachers to believe that they had the skills to succeed. In the debriefing phase after the simulation, the participants were actively engaged in professional reflection, which may have increased their self-efficacy. [44] Furthermore, they observed each other achieving learning outcomes, which also is a source for strengthening teacher self-efficacy. [45] The data showed a tendency of change in the pre-service teachers' perception of self-awareness developing as a process involving their suitability, which underlines that simulation provides opportunities for behavioural and attitudinal changes, [46] in addition to contributing to growth in the professional identity. [47]

When identifying pre-service teachers' personal skills of de-escalating communication, there was low variation upon the questions mean. This was emphasised by limitation in spread because the respondents did not score the lowest values in two of the questions. A high mean indicated that most of the pre-service teachers shared the same personal skills in de-escalating communication, which was verified by feedback from both peers and experts. It cannot be ruled out whether this is a result of self-awareness of suitability for the future professional role due to critical thinking regarding the profession. Hence, the participants confronted each other's perspectives with counterarguments and alternative solutions. [48]

Contextualization in teaching

The third major theme emphasised the pre-service teachers' educational experiences and rapid shifts. When the participants appeared in simulation, they experienced that the context in which they had planned for, changed. An example was a pre-service teacher, who intended to comfort a quiet pupil

crying in the classroom. But when the pupil responded differently than anticipated, the context changed both in the situation and in the communication. Pre-service teacher 1 highlighted this: "I found it challenging that the pupil responded different from what I had prepared for. I tried one strategi but felt lost when that didn't work."

Prior to simulation, most of the participants believed they could deal with the prospective situation, which involved their beliefs in their capabilities to execute the action required to manage the upcoming scenario. The pre-service teachers' feelings of confidence regarding their professional performance were related to self-efficacy. [49] However, when facing obstacles in the contextualization in teaching, some of the participants doubted their abilities in the professional role and related their low perceived self-efficacy to emotional security. Nevertheless, in the debriefing phase, the pre-service teachers recognised that they were reflecting in action, [50] thinking about what to do next. In the debriefing, the participants also processed their doings and reflected on their behaviour, ability to execute actions, and alternative approaches. The development of suitability was highlighted in the discussions, and pre-service teacher 11 stated: "The diversity in the classroom emphasises the importance of the teacher's suitability. I'm more aware of that after this experience."

Several pre-service teachers pointed out the excitement they felt when they overcame the challenge involving the pupil. In addition to achieving their learning outcomes, they also observed peers obtaining common learning outcomes, and these mastering and vicarious experiences became main sources to enhance self-efficacy. [51]

It should be addressed that the pre-service teachers had different starting points related to suitability and where they were in their professional development path. Additionally, the high score in the data is linked to various factors that need to be seen in context. First, the teams established trust, which was a prerequisite in the simulation.[52] However, we have no insight into the dynamics of the groups or the chemistry between the individuals. Thus, we do not know how this may have affected the data. Second, the performance measures were conducted by teacher educators to strengthen the validity. On the other hand, it cannot be excluded that the scorers were biased, because of their relations to the pre-service teachers. Third, the simulation was part of a varied suitability training program, which could impact the high score regarding awareness and knowledge of suitability for becoming teachers.

LIMITATIONS OF THE STUDY

This research project has some limitations. First, the data collection methods used, both the surveys and the focus group discussions, are subject to social desirability bias. However, to reduce this influence, three data sets from the same sample were collected to enable triangulation before and after the simulation. Consequently, there is a call for further studies with data from multiple samples to strengthen the validation. Second, the simulation activity had some pitfalls, where lack of structure may have influenced the data. Nevertheless, in most of the 11 elements, [53] the simulation was well structured, and this pilot study intended to detect weaknesses and limitations to develop a larger scale research project.

SCIENTIFIC SIGNIFICANCE AND IMPLICATIONS

This study provides research-based knowledge related to the development of teacher self-efficacy and awareness of suitability in teacher education. Furthermore, this involves practicing skills and the results show how simulation as a pedagogical method can increase the degree of student-active learning and strengthen the applicability of theoretical knowledge in practical situations. Furthermore, an implication of the study is applying simulation as systematic and structured suitability training in teacher education nationally and internationally, which also may encourage to collaboration involving SBL for suitability in other education programmes and integrating simulation into the curriculum.

Teachers at campus facilitated the simulation in this study, and a venue for further research includes exploring the facilitators' preparations and knowledge of simulation as a pedagogical method.

DECLARATIONS AND CONFLICT OF INTEREST

The authors declare no conflicts of interest with this work.

NOTES

1   Mette Hvalby. "Professional judgement in suitability assessment. The complexity of the role of mentor teachers." *Uniped, 45*(1), pp. 53 – 63, 2022.
2   Ministry of Education and Research. *Forskrift om skikkethetsvurdering i hoyere utdanning*, 2006.
3   Iben Akselbo, Heidi Killingberg, and Ingvild Aune. "Simulation as a pedagogical learning method for critical paediatric nursing in Bachelor of Nursing programmes: a qualitative study." *Adv Simul 5,* 24, 2020; Iben Akselbo and Ingvild Aune. "How to Use Simulation as a Learning Method in Bachelor and Postgraduate/Master Education of Nurses and Teachers in Healthcare." In: I. Akselbo and I. Aune (Eds.) *How Can we Use Simulation to Improve Competencies in Nursing?* Springer, Cham., 2023; Mette Tindvik Hansen, Anne-Grethe Gregersen, Siri Brynhildsen, and Ann-Chatrin Leonardsen. "Nursing students' perceived stress, self-efficacy, control, and evaluation of a course in systematic clinical observation, physical assessment, and decision-making: An observational study in Norway." *Nursing Open, 10*, 1007–1015, 2022; Ricardo Gregorio Lugo, Inger Hjelmeland, Mette Tindvik Hansen, Erna Haug, Stefan Sutterlin, and Heidi Kristine Gronlien. "Impact of initial emotional states and self-efficacy changes on nursing students' practical skills performance in simulation-based education." *Nursing Reports,11*(2), 2021; Silen-Lipponen Marja and Aura Suvi. "Cultural competence learning of the health care students using simulation pedagogy: An integrative review." *Nurse Education in Practice, 52*, 2021.
4   Tara Dalinger, Kathrine B. Thomas, Susan Stansberry, and Ying Xiu. "A mixed reality simulation offers strategic practice for pre-service teachers." *Comput. Educ. 144,* 2019; Orna Levin, Rivi Frei-Landau, and Chen Goldberg. "Development, and validation of a scale to measure the simulation-based learning outcomes in teacher education." *Front. Educ., 8*, 2023.
5   Philipp Tuertscher, Raghu Garud, and Arun Kumaraswamy. "Justification and interlaced knowledge at ATLAS, CERN." *Organization Science 25*(6):1579-1608, 2014.
6   Linda Douw, Bram Mellink, Boris Noordenbos, Elsje van Bergen, Theo Araujo, Anastasia Sergeeva, Antske Fokkens, and MDS Wijkman. "Interdisciplinarity Beyond the Buzzword: A Guide to Academic Work Across Disciplines." *Amsterdam Young Academy (AYA),* 2022.
7   Ministry of Education and Research, *Forskrift om skikkethetsvurdering i hoyere utdanning.*
8   Mette Hvalby. "I do not want to shatter their dreams of becoming teachers" Mentors' use of professional judgement in suitability assessments. In: K. Smith (Ed.), *Inquiry as a bridge in teaching and teacher education*, pp.209-227, 2022. Fagbokforlaget.
9   Elaine Munthe, Erik Ruud, and Kari-Anne Svendsen Malmo. *Praksisopplering i lererutdanninger i Norge; en forskningsoversikt.* Kunnskapssenteret for utdanning, KSU 1, 2020. [An overview of research into practicum in the Norwegian Teacher Education]
10 Joakim Caspersen and Asbjorn Karstein. "Kvalitet i praksis: Oppfatninger om kvalitet." [Qualities in the practicum] NIFU, 14, 2013; Kristin Hjelle. "Suitability assessments in kindergarten teacher education (ECEC)." *Uniped, 44*(4), pp. 287 – 298, 2021; Naustdal, Anne-Grethe and Gabrielsen, Egil. "Den viktige og vanskelige skikkethetsvurderingen; hvilke utfordringer gir den universiteter og hogskoler?" [The important and difficult aspects of suitability assessments] Uniped, 38(1), pp.7–22. 2015.
11 Hvalby, "*I do not want to shatter their dreams of becoming teachers.*", 209 – 227.
12 Tone Dyrdal Solbrekke and Anne Moystad. "Changing practices of Suitability Assessment in a Norwegian Education Dental Programme." *Uniped, 45*(3), 184-194, 2022.
13 Akselbo, Killingberg, and Aune, "*Simulation as a pedagogical learning method for critical paediatric nursing in Bachelor of Nursing programmes.*"
14 Chiang-Chiao Hung, Hsueh-Fen S. Kao, Hsiu-Chen Liu, Hwey-Fang Liang, Tsui- Ping Chu, and Bih-O Lee. "Effects of simulation-based learning on nursing students' perceived competence, self-efficacy and learning satisfaction: A repeat measurement method." *Nurse Education Today,* 97, 2021.
15 Deanna, Kuhn. "A Developmental Model of Critical Thinking". *Educational Researcher, 28*(2), pp.16-25, 1999.
16 Albert Bandura. *Self-Efficacy: The Exercise of Control*. New York: W.H Freeman and Company,1997.
17 Donald Schön. *The Reflective Practitioner: How Professionals Think in Action.* London: Temple Smith, 1983.
18 Kuhn, "*A Developmental Model of Critical Thinking*", 16 – 25.
19 Albert Bandura. *Social Foundations of Thoughts and Actions - a social cognitive theory*. Prentice-Hall, 1986.
20 Bandura, *Self-Efficacy: The Exercise of Control.*
21 Albert Bandura. *Self-Efficacy in Changing Societies.* New York: Cambridge University Press, 1995.
22 Rebecca Lazarides, Helen M. G. Watt, and Paul W. Richardson. "Teachers' classroom management self-efficacy, perceived classroom management and teaching contexts from beginning until mid-career." *Learning and Instruction, 69*(3), 2020.
23 Sabina Valente and Abilio Afonso Lourenço. "Conflict in the Classroom: How Teachers' Emotional Intelligence Influences Conflict Management." *Sec. Educational Psychology,* Volume 5, 2020.
24 Dalinger et al., "*A mixed reality simulation offers strategic practice for pre-service teachers.*"
25 Levin, Frei-Landau, and Goldberg, "*Development, and validation of a scale to measure the simulation-based learning outcomes in teacher education.*"

[26] Hanneke Theelen, Antoine van den Beemt, and Perry den Brok. "Classroom simulations in teacher education to support preservice teachers' interpersonal competence: a systematic literature review." *Comput. Educ.* 129, 14–26, 2019.

[27] Saraswati Dawadi, Sagun Shrestha, and Ram Giri. "Mixed-Methods Research: A Discussion on its Types, Challenges, and Criticisms." *Journal of Practical Studies in Education, 2*(2), pp. 25-36, 2021.

[28] Albine Moser and Irene Korstjens. Series: "Practical guidance to qualitative research. Part 3: Sampling, data collection and analysis." *European Journal of General Practice*, *24*(1), pp.9-18, 2018.

[29] Lori Lioce, Colleen H. Meakim, Mary K. Fey, Joyce Victor, Bette Mariani, and Guillaume Alinier. "Standards of best practice: Simulation standard IX: Simulation design." *Clin. Simul. Nurs. 11,* pp.309–315, 2015.

[30] Hvalby, "*Professional judgement in suitability assessment. The complexity of the role of mentor teachers*.", 53 – 63.

[31] Alexis Artwohl and Loren Christiansen. *Deadly force encounters*. Paladin Press, 1997.

[32] Ole Andre Braten. *Handbok i konflikthandtering: Forebygging av trakassering, trusler og vold*. [Handbook of Conflict Management] Høgskoleforlaget, 2011.

[33] Patricia Leavy. *The Oxford Handbook of Qualitative Research*. Oxford: Oxford University Press, 2014.

[34] Edward M. Sosu. "The development and psychometric validation of a critical thinking disposition scale. Thinking Skills and Creativity." Volume 9, pp.107-119, 2013.

[35] Moser and Korstjens, "*Practical guidance to qualitative research*.", 9 – 18.

[36] Norman K. Denzin. *The research act: A theoretical introduction to sociological methods*. London: Routledge, 2017.

[37] The National Committee for Research Ethics in the Social Sciences and the Humanities (NESH), 2018.

[38] Bandura, *Self-Efficacy in Changing Societies*.

[39] Bandura, *Self-Efficacy: The Exercise of Control.*

[40] Hansen, Gregersen, Brynhildsen, and Leonardsen, "*Nursing students' perceived stress, self-efficacy, control, and evaluation of a course in systematic clinical observation, physical assessment, and decision-making*.", 1007–1015.

[41] Lioce et al., "*Standards of best practice: Simulation standard IX: Simulation design.*," 309–315.

[42] Levin, Frei-Landau, and Goldberg, "*Development, and validation of a scale to measure the simulation-based learning outcomes in teacher education.*"

[43] Bandura, *Self-Efficacy in Changing Societies*.

[44] Theelen, van den Beemt, and den Brok, "*Classroom simulations in teacher education to support preservice teachers' interpersonal competence.*", 14–26.

[45] Bandura, *Self-Efficacy in Changing Societies*.

[46] Levin, Frei-Landau, and Goldberg, "*Development, and validation of a scale to measure the simulation-based learning outcomes in teacher education.*"

[47] Lazarides, Watt, and Richardson, "*Teachers' classroom management self-efficacy, perceived classroom management and teaching contexts from beginning until mid-career.*"

[48] Kuhn, "*A Developmental Model of Critical Thinking*", 16 – 25.

[49] Bandura, *Social Foundations of Thoughts and Actions: a social cognitive theory.*

[50] Schön, *The Reflective Practitioner: How Professionals Think in Action.*

[51] Bandura, *Self-Efficacy in Changing Societies*.

[52] Lioce et al., "*Standards of best practice: Simulation standard IX: Simulation design.*," 309–315.

[53] Lioce et al., "*Standards of best practice: Simulation standard IX: Simulation design.*," 309–315.

BIBLIOGRAPHY

Akselbo, Iben and Ingvild Aune. "How to Use Simulation as a Learning Method in Bachelor and Postgraduate/Master Education of Nurses and Teachers in Healthcare." In: I. Akselbo and I. Aune. (Eds.) How Can we Use Simulation to Improve Competencies in Nursing? *Springer, Cham,* 2023. doi: https://doi.org/10.1007/978-3-031-10399-5_2

Akselbo, Iben, Heidi Killingberg, and Ingvild Aune. "Simulation as a pedagogical learning method for critical paediatric nursing in Bachelor of Nursing programmes: a qualitative study." *Adv Simul 5,* 24, 2020. doi: https://doi.org/10.1186/s41077-020-00140-2

Artwohl, Alexis and Christiansen, Loren. *Deadly force encounters*. Paladin Press, 1997.

Bandura, Albert. *Self-Efficacy in Changing Societies*. New York: Cambridge University Press, 1999.

Bandura, Albert. *Self-Efficacy: The Exercise of Control.* New York: W.H Freeman and Company,1997.

Bandura, Albert. *Social Foundations of Thoughts and Actions: a social cognitive theory.* Prentice-Hall, 1986.

Braten, Ole Andre. *Handbok i konflikthandtering: Forebygging av trakassering, trusler og vold*. [Handbook of Conflict Management] Høgskoleforlaget, 2011.

Caspersen, Joakim and Asbjorn Karstein. "Kvalitet i praksis: Oppfatninger om kvalitet." [Qualities in the practicum] NIFU, 14, 2013. Accessed May 25, 2023. NIFU Open Access Archive: Kvalitet i praksis: Oppfatninger om kvalitet blant praksisveiledere (unit.no)

Dalinger, Tara, Kathrine B. Thomas, Susan Stansberry, and Ying Xiu. "A mixed reality simulation offers strategic practice for pre-service teachers." *Comput. Educ. 144,* 2019. doi: https://doi.org/10.1016/j.compedu.2019.103696

Dawadi, Saraswati, Sagun Shrestha, and Ram Giri. "Mixed-Methods Research: A Discussion on its Types, Challenges, and Criticisms." *Journal of Practical Studies in Education, 2*(2), pp. 25-36, 2021. doi: https://doi.org/10.46809/jpse.v2i2.20

Denzin, Norman K. *The research act: A theoretical introduction to sociological methods.* London: Routledge, 2017.

Douw, Linda, Bram Mellink, Boris Noordenbos, Elsje van Bergen, Theo Araujo, Anastasia Sergeeva, Antske Fokkens, and MDS Wijkman. "Interdisciplinarity Beyond the Buzzword: A Guide to Academic Work Across Disciplines." *Amsterdam Young Academy (AYA),* 2022. doi: https://doi.org/10.5281/zenodo.6341545

Hansen, Mette Tindvik, Anne-Grethe Gregersen, Siri Brynhildsen, and Ann-Chatrin Leonardsen. "Nursing students' perceived stress, self-efficacy, control, and evaluation of a course in systematic clinical observation, physical assessment, and decision-making: An observational study in Norway." *Nursing Open, 10*, 1007–1015, 2022 doi: https://doi.org/10.1002/nop2.1368

Hjelle, Kristin. "Suitability assessments in kindergarten teacher education (ECEC)." *Uniped, 44*(4), pp. 287 – 298, 2021. doi: https://doi.org/10.18261/issn.1893-8981-2021-04-07

Hung, Chiang-Chiao, Hsueh-Fen S. Kao, Hsiu-Chen Liu, Hwey-Fang Liang, Tsui- Ping Chu, and Bih-O Lee. "Effects of simulation-based learning on nursing students' perceived competence, self-efficacy and learning satisfaction: A repeat measurement method." *Nurse Education Today,* 97, 2021. doi: https://doi.org/10.1016/j.nedt.2020.104725

Hvalby, Mette. "Professional judgement in suitability assessment. The complexity of the role of mentor teachers." *Uniped, 45*(1), pp. 53 – 63, 2022. doi: https://doi.org/10.18261/uniped.45.1.6

Hvalby, Mette. "I do not want to shatter their dreams of becoming teachers. Mentors' use of professional judgement in suitability assessments." In: K. Smith (Ed.), *Inquiry as a bridge in teaching and teacher education*, pp.209-227, 2022. Oslo: Fagbokforlaget.

Kuhn, Deanna. "A Developmental Model of Critical Thinking". *Educational Researcher, 28*(2), pp.16-25, 1999. doi: https://doi.org/10.2307/1177186

Lazarides, Rebecca, Helen M. G. Watt, and Paul W. Richardson. "Teachers' classroom management self-efficacy, perceived classroom management and teaching contexts from beginning until mid-career." *Learning and Instruction, 69*(3), 2020. doi: https://doi.org/10.1016/j.learninstruc.2020.101346

Leavy, Patricia. *The Oxford Handbook of Qualitative Research*. Oxford: Oxford University Press, 2014.

Levin, Orna, Rivi Frei-Landau, and Chen Goldberg. "Development, and validation of a scale to measure the simulation-based learning outcomes in teacher education." *Front. Educ., 8*, 2023. doi: https://doi.org/10.3389/feduc.2023.1116626

Lioce, Lori, Colleen H. Meakim, Mary K. Fey, Joyce Victor, Bette Mariani, and Guillaume Alinier. "Standards of best practice: Simulation standard IX: Simulation design." *Clin. Simul. Nurs. 11,* pp.309–315, 2015. Accessed May 25, 2023. doi: https://doi.org/10.1016/j.ecns.2015.03.005

Lugo, Ricardo Gregorio, Inger Hjelmeland, Mette Tindvik Hansen, Erna Haug, Stefan Sutterlin, and Heidi Kristine Gronlien. "Impact of initial emotional states and self-efficacy changes on nursing students' practical skills performance in simulation-based education." *Nursing Reports,11*(2), 2021 doi: https://doi.org/10.3390/nursrep11020026

Marja, Silen-Lipponen and Aura Suvi. "Cultural competence learning of the health care students using simulation pedagogy: An integrative review." *Nurse Education in Practice, 52*, 2021. doi: https://doi.org/10.1016/j.nepr.2021.103044

Ministry of Education and Research. *Forskrift om skikkethetsvurdering i hoyere utdanning*. 2006. Accessed May 25, 2023. https://www.regjeringen.no/no/dokumenter/rundskriv-f-07-16-forskrift-om skikkethetsvurdering-i-hoyere-utdanning/id2516838/

Moser, Albine and Irene Korstjens. Series: "Practical guidance to qualitative research. Part 3: Sampling, data collection and analysis." *European Journal of General Practice*, 24(1), pp.9-18, 2018 doi: https://doi.org/10.1080/13814788.2017.1375092

Munthe, Elaine, Erik Ruud, and Kari-Anne Svendsen Malmo. *Praksisopplering i lererutdanninger i Norge; en forskningsoversikt.* Kunnskapssenteret for utdanning, KSU 1, 2020. [An overview of research into practicum in the Norwegian Teacher Education]

Naustdal, Anne-Grethe and Egil Gabrielsen. "Den viktige og vanskelige skikkethetsvurderingen; hvilke utfordringer gir den universiteter og hogskoler?" [The important and difficult aspects of suitability assessments] *Uniped, 38*(1), pp.7–22. 2015. doi: https://doi.org/10.18261/ISSN1893-8981-2015-01-0

Schön, Donald. *The Reflective Practitioner: How Professionals Think in Action. London:* Temple Smith, 1983.

Solbrekke, Tone Dyrdal and Anne Moystad. "Changing practices of Suitability Assessment in a Norwegian Education Dental Programme." *Uniped, 45*(3), 184-194, 2022. doi: https://doi.org/10.18261/uniped.45.3.3

Sosu, Edward M. "The development and psychometric validation of a critical thinking disposition scale. Thinking Skills and Creativity." Volume 9, 2013, 107-119, 2013. doi: https://doi.org/10.1016/j.tsc.2012.09.002

Theelen, Hanneke, Antoine van den Beemt, and Perry den Brok. "Classroom simulations in teacher education to support preservice teachers' interpersonal competence: a systematic literature review." *Comput. Educ.* 129, 14–26, 2019. doi: https://doi.org/10.1016/j.compedu.2018.10.015

The National Committee for Research Ethics in the Social Sciences and the Humanities (NESH), 2018. Accessed May 25, 2023. https://www.forskningsetikk.no/retningslinjer/humsam/forskningsetiske-retningslinjer-for-samfunnsvitenskap-humaniora-juss-og-teologi/

Philipp Tuertscher, Raghu Garud, and Arun Kumaraswamy. "Justification and interlaced knowledge at ATLAS, CERN." *Organization Science 25*(6):1579-1608, 2014.

Valente, Sabina and Abilio Afonso Lourenço. "Conflict in the Classroom: How Teachers' Emotional Intelligence Influences Conflict Management." *Sec. Educational Psychology,* Volume 5, 2020. doi: https://doi.org/10.3389/feduc.2020.00005