Developing and testing transferability and feasibility of a model for educators using simulation-based learning — A European collaboration

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Abstract

Background: There is a pragmatic and often inconsistent approach of embedding simulation-based learning into nursing programmes. This paper details a European collaboration that designed a model for educator facilitation for educators utilizing simulation-based education.

Objectives: The objectives of the study were to develop a model to educate the educators who deliver simulation-based learning and to test to which extent this model could be transferred to education providers in different national settings.

Methods: This model, its transferability and feasibility, was tested across three European countries. Educators from three Schools of Nursing participated in the study. Design-based Research was used as an overall methodology. Data were collected by the use of pre- and post-programme questionnaires and focus groups.

Results: The content of the NESTLED model is consistent with the needs of the participants. The testing also demonstrated that the model is transferable across-countries. Additionally, the participants' preferences regarding amount of time and pre-reading for the different sessions vary depending on the background and level of seniority of the individual participant.

Conclusion: The testing of the NESTLED model demonstrated that participants gained confidence and knowledge from undertaking the programme. Delivering the NESTLED

model across-countries was found to be feasible, but flexibility is required in terms of logistical delivery of the programme.

Keywords: Simulation-based learning, educators' competencies, European model
Feasibility, Transferability

1. Introduction

The aim of this paper is to detail a research project funded by the European Union (EU) focusing on developing a European Model for educating educators who utilize simulation-based learning (SBL) in nurse education. Discussions will include the development and testing of a prototype within three European Countries and associated universities. The paper will also illuminate a brief appraisal of how this international collaboration affected the process. The focus of the project was primarily concerned with educators in pre-registration nursing. However, the outcomes have relevance for other healthcare education programmes**.**

2. Background

The increasing implementation of SBL and investment in associated technology has escalated in many organizations. SBL has become diverse and often technologically advanced. Many educators have not been afforded the time or exposure to acquire the knowledge and skills required to deliver SBL successfully (Hyland and Hawkins, 2009; van Soeren et al., 2011). In most European countries there is a pragmatic approach to embedding SBL into programmes, leading to individual and inconsistent modes of application. The advantages of SBL are well documented (Al-Ghareeb and Cooper, 2016; Sundler et al., 2015). However, as SBL has become incorporated into nursing curricula, deliberate consideration regarding relevant pedagogy and educational theories that support SBL has become secondary or detached. Capital expenditure on developing educational environments has not been matched with investment in the capability of educators to maximise the potential of SBL (Kaakinen and Arwood, 2009). With such investment, there is pressure on educators to use these resources (Kaakinen and Arwood, 2009; Miller and Bull, 2013). Without equal commitment to investing in the educators, there is a realisation of not achieving the potential of SBL. This concern was shared by representatives from the University of Huddersfield, UK, Metropolia University of Applied

Sciences, Finland and VIA University College, Denmark who initialized a collaboration to explore this realisation that developing SBL facilities in isolation of those who use it was not ideal. The collaboration was cemented following an initial review of the existing literature (Topping et al., 2015). The review revealed that a skilled educator is a pre-requisite for effective SBL and a number of educator competencies that underpin the approach were identified. Prior to publication of this review, key data identified from the reviewed literature was submitted as supporting rationale in applying for funding to develop a research project that would investigate further the fundamental attributes educators who utilize SBL require. The bid was successful and from this NESTLED (Nurse Educator Simulation Based Learning Development) was established (www.nestled.eu).

Although the NESTLED research team (NRT) recognised existing programmes for educator development, the aim of this project was to develop a comprehensive model that would address the skills and competencies identified from the initial review and synthesis of the literature (Topping et al., 2015). A catalyst to the project's aim was the securing of an EU funding grant that purported its own requirement to transfer and develop an existing innovation. Therefore, the overall aim of NESTLED was to develop an existing educational innovation and from this, design the prototype of a model for educator facilitation for educators utilizing SBL. This prototype, and its transferability, would be tested and evaluated in Denmark, Finland and Estonia.

3. Design

The overall methodology used was Design Based Research (DBR) (Barab and Squire, 2004). DBR progresses in iterative cycles consisting of five phases; development needs analysis, solution construction, solution testing, refining, reflection and reporting. In each cycle, data are collected and analyzed before the next planning phase (Barab and Squire, 2004). The NESTLED project covered two cycles over a two-year period. Functionalities, contents and pedagogical methods were designed, tested, analyzed and redesigned in order to develop the NESTLED model.

3.1 Methods

To meet the demands of the EU funding, the NRT decided to test the feasibility of the NESTLED model by focusing on the concepts of acceptability and expansion. Acceptability refers to what extent a new idea, programme, process or measure is judged as suitable to the recipients. Expansion refers to potential success of an already-successful intervention with a different population or in a different setting (Bowen et al., 2009).

The Kirkpatrick Model (Kirkpatrick and Kirkpatrick, 2006) was utilized in the design of evaluation tools, focusing on level 1–3:

1. To what degree participants react favourably to the training
2. To what degree participants acquire the intended knowledge, skills, attitudes, confidence and commitment
3. To what degree participants apply what they learned when they are back on the job

Pre- and post-programme questionnaires and focus groups were used for data-collection

3.2 Questionnaires

Collecting data using questionnaires was considered appropriate because they offer objective means of assessing participants' perspectives (Boynton and Greenhalgh, 2004). A questionnaire would be efficient to distribute across project sites, and could return information in a short time period. The majority of questions employed a five-point Likert Scale, ranging from 'Very Confident' to 'Not Confident at All'. The language chosen was English. To aid analysis for both the pre- and post- programme questionnaires, questions 1–21 were divided into three categories: 'preparation for the SBL event', 'delivering the SBL event' and 'feedback and evaluation of the SBL event'. Table 1 identifies the Cronbach's alpha scores for each of these three categories.

Table 1: Cronbach's alpha scores for pre- and post-program questionnaires for participants.

	Category	Cronbach's α scores
Pre-program questionnaire	1	0.795
	2	0.849
	3	0.712
Post-program questionnaire	1	0.743
	2	0.907
	3	0.807

3.3 Focus groups

At the conclusion of each course, a focus group was held with the participants. Ethical approval was obtained in line with the institutional requirements. The NRT anticipated that involving small groups of five to ten people would provide opportunity for opinions and experiences to be solicited simultaneously (Polit and Beck, 2013). All focus groups were video-recorded and transcribed verbatim. Each focus group followed the same format to

aid reliability and validity with questions closely linked to the eight sessions of the NESTLED model. This could suggest a “theoretical approach” but a more inductive approach was used to allow themes beyond the sessions themselves to emerge. Braun and Clarke's (2006) six stage approach to thematic analysis was utilized to guide the analysis process. A semantic level of analysis where themes are identified explicitly from what the participants have said was considered most appropriate to the qualitative self-report technique of focus groups (Braun and Clarke, 2006). Each focus group was analyzed separately by one member of the NRT.

4. Developing a Prototype

The foundation for this prototype was an existing Master's level programme focusing on teaching using SBL delivered at the University of Huddersfield. Secondly, the competencies identified from the review and synthesis of the literature (Topping et al., 2015) were included. The prototype consisted of eight sessions that together produced the NESTLED model, Table 2.

5. Testing Feasibility of the Prototype

Three feasibility tests were conducted. The programme was structured to provide 30 h of lectures, presentations, group work and discussion. Members of the NRT facilitated the course. The participants were lecturers or senior lecturers identified by the Heads of Schools. Experience amongst the participants of using SBL ranged from experienced to novice. The participants held between one to 24 years of teaching experience, and their educational level ranged from bachelor to PhD. The first feasibility test that took place in Denmark was conducted over four consecutive days and had eleven participants. The second feasibility test was conducted in Finland where the programme was held over five days spread across several weeks. Fourteen participants were recruited from the School of Nursing. In Estonia the programme was delivered in the same manner as in Finland with eight participants recruited by the Head of School.

Table 2: An overview of elements of the NESTLED model

Session	Content	Learning and teaching strategy
1.Background to simulation-based learning	Theories of learning through simulation and facilitation and definitions, simulation based learning cycle (SLC) and evidence based competencies.	Pre-reading (directed reading) and didactic
2. Pre-planning	Curriculum, design and operationalisation (positioning SBL) Devising SBL (level, baseline and contributory learning, audience [uni or interprofessional], assessment [formative/summative])	Group work activity including curriculum analysis. Lecture/discussion
3. Hypothetical case development	Devising and planning delivery, Case design, Operational planning (equipment, setting, staffing, instructions, guidance development, handouts, etc.)	Mini-lecture Discussion Group work activity Design and planning of delivery of a hypothetical case.
4. Briefing	Creating the learning climate, Preparing the student: ground rules, engagement and professional identity, Students as formative assessors and responsibilities/peer reviewer	Simulation Video recording and facilitated discussion
5. Delivery "running the sim"	Different roles of facilitator, managing groups (large and small), managing individuals, using and trouble-shooting equipment, time management including deviations from planning and disruptions. Improvisation. Acting	Simulation (recorded) Discussion (face to face) Structured on line discussion (recording available to participants online)

6. Debriefing	Different forms of debriefing including theory, techniques, timing, familiarity with video, debriefing in groups, individuals, Ethical issues to do with confidentiality.	Mini-lecture, Discussion Role-play Simulation. Recorded
7. Evaluation of student learning	Theory of assessment. Assessment strategies including formative and summative and competency assessment. Assessment schemas. Rater reliability and validity of assessment. Rater negotiation and consensus.	Pre-reading Discussion Interactive appraisal of example of (recorded) assessment Reflection Reflective writing SPE
8 Evaluation of the simulation-based learning (the "learning experience")	Modes of evaluation. Theoretical input on different ways of evaluating	Discussion Workshop activity

5.1 Results from the Feasibility Tests

5.1.1. Pre- and Post-Programme Questionnaires

In Denmark, eight participants completed both the pre- and postprogramme questionnaires. Due to the aims and scope of the feasibility test, and the limited data available, data analysis was confined to a comparison between the mean of all responses using Wilcoxon signed rank test. This analysis showed a significant increase in confidence demonstrated across all 21 questions ($Z = 2.240$; $\rho = 0.025$) Table 3. Analysis indicated a significant increase in confidence in preparing for the SBL event, including an understanding of learning theories that support SBL. A significant increase in confidence in running the SBL event was identified, but the increase in confidence for feedback and evaluation following the SBL event was not statistically significant. Further analysis of the pre-programme questionnaire identified that the eight participants had, for the category three statements, a range of scores between 1.50 and 3.75 (Mean: 2.95, SD: 0.85). The fact that the participants were not already 'very confident' prior to the programme suggests that the lack of a significant increase in confidence after completing the programme was of concern to the NRT and indicated changes needed to be made to the section.

Six of the questions offered participants the opportunity to provide free text responses, from where two key themes emerged:

- Difficulty working with groups, especially if there was an issue with group dynamics
- Skills of debriefing, with the participants recognising the importance of this component but feeling that they lacked the requisite skills

Table 3: Wilcoxon signed rank test scores related to the 'increased confidence' amongst the participants in each category of questions.

Category	Asymp. Sig (2-tailed)
1	$Z=-2.524$; $\rho=0.012$
2	$Z=-2.103$; $\rho=0.035$
3	$Z=-1.126$; $\rho=0.260$

The post-programme questionnaire repeated the same free text questions and indicated that the participants now felt more confident in managing group dynamics and the debrief, although, as discussed, this increase in confidence was not statistically significant. Participants were asked what further learning they would like to undertake. The feedback included the need to learn how to use high-fidelity manikins and the use of video debriefing.

There was a very low response rate with only one participant from Finland and three from Estonia completing both the pre- and postprogramme questionnaires. It was agreed by the NRT that it was not possible to extract any valid and reliable conclusions from this limited data.

5.1.2 Focus groups

The results from the focus groups are presented as a whole. Despite changes to the programme that were made after the test in Denmark, nuances were added but no new themes emerged from the analysis. The changes made were pre-reading and contact time regarding the sessions on learning theories, embedding simulation, debrief and evaluation, and by adding individual assignments to be completed between taught sessions Ten participants attended the focus group (Danish Participant (DP) 1 to 10), held at the end of day four. Three participants attended the focus group in Finland (Finnish Participant (FP) 1 to 3) and eight participants attended the meeting in Estonia (Estonian Participant (EP) 1 to 8). The focus groups were facilitated by members of the NRT. The focus groups were held in English, video-recorded and transcribed verbatim. In Estonia, the facilitator asked questions in English which were then translated into Estonian by a translator. Most responses were given in Estonian and translated back into English.

Phase one analysis (Braun and Clarke, 2006) indicated a generally positive evaluation of the NESTLED programme and participants had developed their understanding of SBL and that some had identified several 'barriers' to utilizing SBL in their own work setting. Some participants felt that more time and a little more structure, especially in relation to the debriefing session was required. Participants commented positively on the balance between theory and group work, including simulation, although DP8 felt that the theory 'load' in the first two days had been a little high. One participant (DP3) also felt that the programme would benefit from being held over a longer period. The themes identified through the phases two to five (Braun and Clarke, 2006) are shown in Table 4. Although these themes did 'emerge' from the focus group data, they bore similar traits to the categories used during analysis of the pre- and post-programme questionnaire data. As such, the same wording was used.

Table 4: Themes identified during the analysis of focus group data.

Preparing for the simulation-based learning event
Embedding simulation
Learning theories
Scope of SBL
Delivering the simulation-based learning event
Group dynamics
Running the SBL event
Technology
Evaluation of the NESTLED program
Feedback and evaluation of the simulation-based learning event
Debriefing
Evaluating the SBL event
Simulation-based acessment
Barriers to simulation-based learning
Personal development
Networking
New skills and knowledge

5.1.3 Preparing for the SBL event

Participants generally agreed that their understanding of learning theories in the context of SBL had developed. DP7 suggested that, "*There were some theories that made my perspective wide*r", and added, "*The learning theories provided me with different definitions of simulation. I need that*." There were discussions on the embedding of SBL into broader curricula and how their students' experiences in clinical practice could be better linked to what is covered using SBL. It was clear from the discussions that some of this remained 'aspirational', but there was a desire to return to their own settings and increase the profile of SBL. As DP7 stated, "I need to argument (sic) for my manager and anyone else why simulation should be used, and the effects." FP2 commented that they felt as if the theory session "was quite long," and would have preferred to move on to actually planning the SBL event. Some participants commented that their perceptions of the scope of simulation had changed. As EP4 stated; "*Before that [I] thought that simulation could only be done on manikins*." Pre-briefing was now seen as vitally important. DP5 stated:

> "*I have come to the conclusion how important the briefing is. It hasn't been a part of simulation that I have prioritised so much before but now I am certain that I am going to put some more time in*".

Participants also recognised the significance of good scenario development; how much attention and time they should give to writing the scenarios. However, this was put into context with other aspects of the SBL event. As DP3 stated:

> "*You have to pay much more attention than just to the scenario. Briefing and debriefing is so important. I did not know that before I got here. The section on the course has helped me to think of these things, including the setting out of the scenarios*".

Finnish participants generally agreed that the NESTLED programme structure had not allowed them sufficient time to write the scenarios between taught sessions, with their day-to-day roles not permitting them the space required.

5.1.4 Delivering the SBL event

There were discussions on group dynamics and a suggestion that the NESTLED programme needed to include more time on this aspect. Technology around running the SBL event also featured, especially in relation to what should be taught on the programme. DP1 suggested that the programme should include, "What is realistic? What are we able to do as teachers?", and DP8 suggested:

> "*The possibility when you programme your scenario … being a good observer while the scenarios goes on so we have the log book, whatever it is called, without taking too much focus off the scenario*".

There were some discussions on working alongside technicians, "*because we don't use it [the manikin] all the year round we forget. If you don't use it regularly you forget how to do stuff*," (DP2). DP2 also suggested the potential use of video clips on the course covering the "*technical' elements*". There was a clear recognition that SBL did not necessarily require 'technology'. As DP1 stated, "*It is good to know that you can make a simulation without technology*."

5.1.5 Feedback and Evaluation of the SBL Event

There were some mixed messages regarding the strength of the session on debriefing.

DP8 suggested:

> "*Build more tools for the teachers into this course so that you get familiar using them. Erhm.., would help me to understand so it becomes a part of us, when we do the debriefing, because sometimes it is a hard way and we are a little bit insecure sometimes when we watch that on the video … how do we guide them through this debriefing without taking the room and being…so we only do the 25% talking and they do the 75%, because sometimes it is the other way round*".

However, the feedback on this section was not all negative. DP7, stated that:

> "*I think I have learned a lot from the debriefing. You need to consider a lot of things. I have been reading the text that the students should read and I've been trying to look at what happened during the scenario and then we talk about that. But the way you put in your questions, you formulate your questions is so important*".

And EP3 stated that:

> "*For me the biggest change is in the feedback. So much feedback for me as a teacher. I have learnt to [involve the] students to give feedback after simulation. Before I have, 'this was right, this was wrong,' and now I gain their remarks and points of view*".

SBL assessment was also discussed with participants outlining how they currently used simulation to assess student learning and how they could develop this in the future.

5.1.6 Barriers to SBL

One definite barrier to effective SBL was identified as "*time*", particularly related to the fact that some participants were the sole facilitator of SBL at their institutions. DP10 stated that, "*I need a lot more time to do this… I am very tired because I'm the only one*", with DP4 adding:

> "*Normally at home I do the operating, the facilitating, the patient, the doctor I would be, erm, play all the roles. Now I am going to make a change and talk to my leader, make sure that we are more teachers in these settings. It's too much having all these roles so that's what I got out of this; that I'll go home and change things*".

5.1.7 Personal development

A number of participants indicated that their knowledge and skills in relation to SBL had developed as a result of undertaking the programme. DP6 suggested that: "*I think as I am*

new to simulation it has provided me with a sort of background to go and try to work with simulation and try a scenario so, it's is a very good background for me".

DP2 stated:

> "*My first thought was I'm going home to facilitate and I'm going home to make new scenarios or actually reuse our cases, but put them from the classroom and down to the lab. But now I know I need to wait at least half a year because I need to work with it and I need to work with myself and my colleagues also who have to agree on this, how we are doing this, and we have to be ready when we do it. So, that's the thing I've learnt*".

There was consensus that they could not work in isolation and needed to improve collaboration with colleagues in their respective organizations, from clinical practice and with other healthcare professional groups. As DP4 suggested, "*Maybe we could collaborate with some other therapists and other similar health backgrounds to create authentic scenarios*."

6. Discussion

The overall results from the feasibility tests of the NESTLED programme involving participants from three different European universities are positive and reveal that the participants experienced anincreased understanding of and in the use of SBL in nursing education.

The content and structure of the programme evaluated well across all participants. Some suggested minor alterations to the timings of specific sessions, including debriefing, and a greater emphasis on group dynamics and technology. Time was a major aspect referred to when considering the structure of the programme. The Danish participants who attended the programme spread over four consecutive days felt that this was too concentrated and needed to be spread over a longer period of time. This was factored into the programmes held in Finland and Estonia, but interestingly, participants from Finland felt that insufficient time was allocated to them from their own managers to complete the formative work.

Despite a growing awareness of the need to underpin SBL activities with appropriate learning theory or frameworks, research has demonstrated a lack of such considerations by those delivering SBL (Arthur et al., 2011). Schiavenato's (2009) well-documented recognition for greater consideration of learning theories in simulation was subsequently addressed by others (Arthur et al., 2011; Walton et al., 2011).

No single learning theory completely addresses the scope of and implications for SBL, and where learning theories are considered, there tends to be a focus on SBL as a teaching rather than a learning strategy (Kaakinen and Arwood, 2009). Participants on the programme had a range of experience as educators but still appreciated the emphasis on the underpinning learning theories acknowledging that these had had a positive impact on their understanding of the value and scope of SBL. The analysis also revealed that participants gained knowledge about briefing and recognised this as an integral part of any SBL event. Prebriefing has been identified as one of three important stages of the feedback and as important at the debriefing (Brackney and Priode, 2015; Motola et al., 2013). The participants discussed a more structured approach to designing scenarios after attending the NESTLED programme. This is interesting in light of the availability of frameworks that offer insight into how simulation is understood and operationalized (Bland et al., 2011; Jeffries, 2007), which may indicate that in some areas, the use of frameworks has not been realised.

Participants from Denmark felt more time needed to be spent discussing group dynamics. Many of these participants were experienced lecturers and were used to managing large and small groups in contexts other than SBL. One explanation may be that the request for more information on group dynamics highlights a difference in the way groups are/should be managed in the context of SBL. Simulation is associated with active and social learning strategies (Bland and Tobbell, 2016). Managing students who are engaged in social and active participation is considerably different to managing groups of students who are in a more passive learning environment. Participants also identified that the scope of SBL did not always necessitate the use of technology. Overall the participants felt better prepared to conduct a debrief after attending the NESTLED programme. The programme facilitated a generic approach to detailing the approaches to debriefing in SBL. Not surprisingly participants requested more examples of specific tools/methods for debriefing.

Technology was a significant barrier identified by the participants. The initial literature review (Topping et al., 2015) concluded that technical skills are essential in order to be able to run a SBL event. The issue is how to include the relevant information in a clear, meaningful way, especially with such a range of technology available for use in SBL. It could be argued that a programme like NESTLED should only offer a general introduction to available technology; with manufacturers and companies who supply the equipment being responsible for teaching and demonstrating the technical potential to ensure currency of the information. It should be acknowledged that not all simulations require technical equipment. A more pragmatic and potential successful solution for those simulations that

do utilize technology would be for programmes such as NESTLED to be adopted and developed by such manufacturers.

A number of participants identified a sense of isolation as a barrier to SBL. They worked alone or in small teams and often felt the challenge of promoting the use of SBL to other colleagues. After undertaking the programme, however, they found knowledge of enablers and barriers useful in facilitating them to discuss with key stakeholders the use of SBL in their organizations. Some discussed a real sense of 'empowerment'. Effective networking with colleagues from other discipline and other organizations was also seen as being very useful. The majority of participants clearly identified how the programme had impacted positively on their personal development. There was a feeling of being 'energized', leading to a determination to make a difference when they returned to their own settings.

The international collaboration with members representing four different institutions, education systems and European countries influenced the project in various ways. The requirement to transfer an existing programme to other national contexts gave the project group some challenges in relation to different regulations and accreditation schemes. However, these challenges gave direction to develop a comprehensive programme fit for different national settings.

As with any collaborative process, there were practical challenges, for example, utilizing technology to co-ordinate on-line meetings, workloads and individual commitments conflicted with the project's progression points and the timing of institutional holidays, resulted in delayed communication. It takes time to build effective working relationships and the NRT recognised the importance of spending time together in a social context, respecting each other's cultural and personal differences. A key requirement of the EU funding was to build a social element into the project. This was particularly beneficial in cementing working relationships that have extended beyond the length of the project. Further collaboration is planned.

Unfortunately, the number of participants on each programme was lower than anticipated, mainly due to difficulties in participants being released to attend. In addition, the low response rate for questionnaires may have been due to the fact that they were sent from the evaluation lead based in the UK, who was unknown to many of the participants. Significantly, the response rate from the programme in Denmark, at which the evaluation lead was present, was higher than that for Finland or Estonia.

Focus groups provided the most valuable data. The use of non-native language for the focus groups and the requirement to use a translator during the Estonian focus group might have

affected the richness of data collected. Nonetheless, the NRT is confident that the programme has been robustly evaluated at levels one and two of the Kirkpatrick Model (Kirkpatrick and Kirkpatrick, 2006).

Following this robust evaluation an interesting development occurred that has provided potential for dissemination of this NESTLED programme and opportunity for further data collection and deeper analysis of the attributes of this programme that prepare faculty on implementing simulation-based education strategies. Laerdal Medical approached the NRT to develop a further collaboration utilizing the NESTLED programme for educating their educators and customers who utilize their medical simulation products. This would enable a tested framework to inform and prepare their educators and customers which addresses a recognised shortfall in that faculty require structured evidence- based preparation to successfully and effectively utilize such equipment. This developing collaboration is one example of how the NESTLED programme may be adopted and utilized to better inform faculty to address the challenges of implementing SBL and provide a platform for additional data collection.

7. Conclusion

Testing the NESTLED model has given the NRT valuable information about content and structure. Participants were generally positive about the content, and feedback regarding the programme structure confirmed the need to offer flexibility in its delivery across contexts. Overall, the testing across three European countries demonstrated that participants gained confidence and knowledge through undertaking the NESTLED programme. Delivering the NESTLED programme across different countries is feasible, but flexibility is required in terms of logistical delivery, especially in relation to the number of contact hours, and where and when the contact hours are placed in order to meet the demands of the different educational systems and to suit the busy schedules of many potential participants.

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