TOWARDS SIMULATION PEDAGOGY

Developing Nursing Simulation in a European Network

Eds. Esa Poikela & Paula Poikela

TOWARDS SIMULATION PEDAGOGY

PUBLISHER

ROVANIEMI UNIVERSITY OF APPLIED SCIENCES
Publications
Jokiväylä 11 C
FI-96300 Rovaniemi
Tel. +358 20 798 5454
julkaisut@ramk.fi

PUBLICATION SERIES A

Studies and conference publications (referee) no. 2

ISSN

1239-7725

ISBN

978-952-5923-35-3 (bind)

ISBN

978-952-5923-36-0 (PDF)

This book was produced in the ESF-funded project “Ensuring expertise in patient safety and customer safety in simulation environments” (abbreviated as TOVI-project)

Translated by Lauri Hanhimäki, Translation Service Metaphor (translated from the Finnish version: articles 1, 2, 3, 5 and 11, others spellchecked)

LAYOUT

Seven-1

PRINTED BY

Kopijyvä Oy, Jyväskylä

Rovaniemi 2012

Rovaniemen ammattikorkeakoulu
University of Applied Sciences
LUC

European Union
European Social Fund

Leverage from the EU
2007–2013

Photos: Niko Tieranta (nature photos), Virtual Center of Wellness Campus, page 8 Thinkstock, page 101 pictures from the Levi seminar Juha-Pekka Laakso.

TOWARDS SIMULATION PEDAGOGY

Developing Nursing Simulation in a European Network

Eds. Esa Poikela & Paula Poikela

Contents

Foreword

Simulation-based nursing education is here to stay and to develop onto the best possible level. It is no longer possible to avoid the new winds that are blowing in education. Changes are being demanded by practical competence requirements and the changing contents of work, which set requirements for employees. Nursing staff that mechanically executes care is not needed any more. Innovative nurses who are capable of making decisions and providing care on the basis of research are in high demand in the job market. Antti Kauppi states that work is changing and asks whether learning is changing as well.[1] He goes on to claim that since work is changing, knowledge-related and intellectual capital is needed. Constantly changing work policies lead to situations in which old routines do not work any more. Universities of applied sciences must meet this challenge of change.

The Rovaniemi University of Applied Sciences (RAMK) has developed learning environments and pedagogic learning models during the 2000s. ENVI – the Virtual Centre of the Wellness Campus is a learning environment that was developed in co-operation with working life to meet the learning needs of students and to provide health care professionals an opportunity to maintain and develop their competence. The development of the learning environment was partly ESF- and ERDF-funded.

The articles in the compilation *Simulation in Nursing Education* (Jeffries 2007) emphasise the various opportunities for using simulation-based learning. RAMK is committed to developing these opportunities in order to stress the importance of patient and customer safety in the basic physiotherapy and nursing education by developing pedagogic methods through simulation methods.

Simulation-based nursing education is being developed enthusiastically in various European countries. In all these countries, good job is being done and the best possible pedagogic solutions pertaining to simulation-based learning are being identified. From this starting point, we have implemented a two-year ESF-funded project *Ensuring expertise in patient safety and customer safety in simulation environments* (abbreviated as 'TOVI project'). The objective of the project has been to identify good practices for simulation that can be shared and developed further.

You will find good practices pertaining to simulation of nursing from these pages.

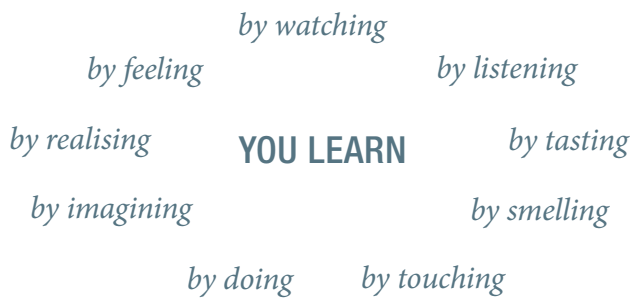
Welcome to the flow of learning!

Paula Poikela
Project Manager

[1] Kauppi, A (2004) Työ muuttuu – muuttuuko oppiminen?, in Tynjälä, P., Välimaa, J. and Murtonen, M. (eds.), *Korkeakoulutus, oppiminen ja työelämä*, Juva: Ps-kustannus.

Developing Simulation-Based Education

➥ ESA POIKELA & PAULA POIKELA



Jeannette Vos

A WIDE-SPREAD DEBATE began in the 2000s regarding the near-miss incidences that occur in health care during treatment and the clear malpractices that cause unnecessary suffering to the patient. Patients' in-hospital times are becoming longer, which causes high additional costs in the national economy. The patient and the suffering of his/her family are an issue that cannot be evaluated by money or on a scale of national economy. What measures can we take already during nursing education?

Nowadays, health care educators face dramatic changes and challenges in meeting the vocational skills requirements of health care and especially nursing. Health care settings have become more technical, quick decision-making in treatment situations and multi-professional co-operation are needed and the competence of the personnel has to be based on research and proof. The Ministry of Social Affairs and Health has published a Finnish patient safety strategy 'Promoting Patient Safety Together' for 2009–2013. According to the strategy, patient safety is taken into account in health care research and education and included in basic, further and continuing education and leadership training. In order to implement the strategy, the teaching methods of health care education need to be renewed.

Simulation-based learning was initially adopted in medical education as a method for learning particular skills and procedures for life-threatening situations. Gradually, simulation-based learning was introduced to the training of entire treatment processes, and the entire team that was required for providing the treatment now participated in the sessions. The teams include assisting staff members, nurses and physicians. Simulation-based learning was discovered to be well-suited for nursing education as well. The scope of application, however, turned out to extend beyond mere acute treatment situations to interaction, ethical issues and patient guidance.

The social constructivist Gergen (1997) states that in learning the learner is encouraged to perceive

knowledge formation as connected to culture and earlier knowledge, i.e. the historical background from which the learner has left. Learning brings out emotions, which cannot be separated from the context of learning. What, then, makes simulation-based learning an excellent method?

Simulation-based learning follows a script, i.e. a scenario that defines the objectives of the learning subject and the stages of the learning process (cf. Hale & Ahlschlager 2011; Nehring & Lashley 2010). In other words, a simulation scenario refers to an action-based learning cycle (cf. Kolb 1984) in which reflection is related to every stage that produces learning (see Poikela in this book, p. 14–25). Reflection begins with the so-called warm-up, during which students individually and together prepare for the simulation. During the simulation, learners reflect on their action, which enables correcting actions that do not match the objective. The event results in an experience that the students reflect on with with the instructor. Also the instructor's actions are thoroughly reflective, as the instructor participates in every stage of the simulation.

Problem-Based Learning as a Pedagogic Framework

Virtual- and simulation-aided education and learning environments for a new kind of learning have been developed in the Rovaniemi University of Applied Sciences since 2005. In these environments, learning begins at the site and proceeds via transport to the emergency room and from there to the ward and, if necessary, to the rehabilitation unit. During the entire process, a health-promoting and rehabilitating nursing approach is applied. The conception of learning has been developed into wholes in order to reach the practical nursing competences, which is supported by the renewal of the curriculum on the lines of problem-based learning (abbreviated to PBL)[1].

In comparison to conventional pedagogy, PBL has four fundamental differences. Instead of learning contents, learning is organised around *problems* pertaining to working life; learning is based on guided knowledge processing in *tutorials and independent knowledge retrieval* that is carried out individually or in small groups between the tutorial sessions; continuous reflection, feedback and mutual assessment are a permanent aspect of learning guidance and *process evaluation* is very significant for the production of learning and competence and transparency is expected of *product assessment* criteria; education that is based on the logic of problem-solving requires support from an integrated curriculum that is based on a multisectoral and multidisciplinary approach.

In the first tutorial session, the problem is discussed and the problem-solving cycle begins[2]. At the beginning of the cycle, students need to seek *mutual understanding* regarding the perspective within the problem and related concepts. The purpose of the second stage is to evoke students' earlier *subject knowledge* by creating ideas pertaining to the problem and the possibilities of handling the problem. At the third stage, the ideas are *categorised* into main categories by separating differing concepts and gathering similar concepts. At the fourth stage, the problems or themes that are the most essential and topical for learning are *selected*. At the fifth stage, knowledge gaps and unclear aspects are searched for by defining objectives and *learning tasks* on the basis of the selected theme.

Simulations, projects and training are related to the sixth stage, the stage of *independent knowledge retrieval,* which also includes utilising

[1] PBL differs radically from traditional didactic models, and it is a step forward compared to earlier experiential (Kolb 1984), co-operative (Johnson & Johnson 1987), situational (Lave & Wenger 1991) or organisational (Argyris & Schön 1995) learning models and theories. PBL provides an ontological and epistemic framework for observing simulation-based learning from the perspective of knowledge construction and learning activity. As a contrast to conventional pedagogy, PBL rejects the presumption that contents are the reason for learning. The reason for learning is in the learner and in the learner's relationship to the external world.

[2] The best-known models in problem-based pedagogy are the stage- and step-based models that originated in Maastricht University in the Netherlands and McMaster University in Canada. Another school within problem-based pedagogy has evolved around the cyclic models that were developed in Linköping University in Sweden and the University of Newcastle in Australia (Poikela 1998). The Rovaniemi University of Applied Sciences is using a cyclic problem-solving model.

lectures, exercises and other education to support self-studying. In other words, students work by themselves and in small groups and utilise virtual learning platforms to familiarise themselves with theoretical and practical sources of knowledge before the next tutorial session.

The seventh stage at the beginning of the second tutorial session is a practical test that indicates how successful the self-studying has been and how well the student is able to *re-conceptualise* the learned content. The knowledge that has been obtained as a result of the self-studying must lead to the re-integration and synthesis of the chosen problem and learning objectives. At the eighth stage, the learner returns to the initial situation, which crystallises the conception of the progress of problem-solving and learning and helps to continue the process on the basis of a new problem.

Process evaluation is part of each stage of the cycle. At the end of each tutorial, it is useful to have a feedback and assessment discussion that provides the learners with knowledge of their own learning, their participation in the team process and the problem-solving progress, after which the team is ready to begin a new problem-solving cycle. (Poikela, E. & Poikela, S. 2006).

The tutorial session is *a space for conceptual work* that provides abilities for professional thinking, planning and problem-solving. Similarly, simulation offers *a space for practical work,* in which the learners learn to act and make quick decisions like professionals. Supporting comprehensive learning requires an integrated curriculum that includes the dimensions of both conceptual and practical work.

In order to meet the challenges of patient safety, Rovaniemi University of Applied Sciences has set the establishment of a PBL curriculum as its objective. ENVI, the Virtual Centre of the Wellness Campus of the Rovaniemi University of Applied Sciences, that was developed earlier shows the need for a new kind of pedagogy that is based on problem-solving. At ENVI, it is possible to simulate the patient's journey from the site, via paramedic treatment and transportation, to acute treatment, to the hospital ward and, eventually, home via rehabilitation. Therefore, ENVI helps the student to conceive the overall treatment path of the patient.

TOVI Project

European higher education institutions and hospitals are facing the same challenges: How to increase students' patient safety awareness already during education and how to ensure that the skills of the hospital staff are maintained? In many countries, it has been noticed that simulation-based education is an effective way to meet these challenges. This has ultimately led to the development of a European network, *Ensuring expertise in patient and customer safety in simulation environments,* i.e. the TOVI project that includes a benchmarking study on simulation implementations and the best practices of simulation-based education. The project also includes testing them and studying their effect on student learning.

The challenge for professional competence in nursing is to develop the division of work between physicians and nurses. As the population becomes older, patients have multiple diseases, which make treatment situations more complicated. As the level of education among people has increased, clients have become more demanding. Educators need to recognise the challenges for curriculum and education that stem from these factors in order to ensure patient safety skills. Simulation environments and simulation-based education support students' learning and training of clinical skills.

During the ENVI Virtual Centre of the Wellness Campus projects (2005–2007), collection of preliminary information on curricula and pedagogic solutions by studying Finnish and European simulations centres was commenced, international conferences on simulation pedagogy for working life and educators were attended and studies were reviewed through literature. In addition, there are several dissertation studies being conducted in the University of Lapland on the functionality of simulation environments and the development of pedagogic solutions. The nursing degree programme, which uses the ENVI environment the most, received the quality award of the Finnish Higher Education Evaluation Council.

Finding good practices requires further developing of pedagogic and curriculum-related solutions. Good pedagogic practices can be found e.g. from Europe, the USA and Canada. The TOVI project succeeded in establishing a co-operation

network that is excited to activate the development of simulation education. Also several other countries have later expressed their interest to join the network. The higher education institutions of the network at the first phase:

- Birmingham City University, the United Kingdom
- Danish Institute for Medical Simulation, University of Copenhagen, Denmark
- Fulda University of Applied Sciences, Germany
- Gjøvik University College, Norway
- Hanze University Groningen, the Netherlands
- Malmö University, Sweden
- Metropolitan University College, Denmark
- Rovaniemi University of Applied Sciences, Finland
- Tampere University of Applied Sciences, Finland
- Umeå University, Department of Nursing, Sweden
- University of Cantabria, Spain
- University of Ostrava, the Czech Republic
- University of South Bohemia, the Czech Republic

The object of the TOVI project is to search for, compare and disseminate international good practices in simulation education and curricular solutions in the field of health care. The goal is to ensure customer-oriented, patient-safe expertise in nursing education and supplementary education given to health care professionals. Project objectives:

- An international network of simulation education in Europe, comprised of higher education teachers in the field of health care and hospitals' planners of supplementary education
- The comparison and analysis of good practices in simulation education and curricular solutions in nursing
- An international seminar in Rovaniemi to share the results
- A written publication about simulation education and curricular solutions

Knowledge about best practices in simulation education and curricular solutions will enhance education, student counselling and planning and implementation of supplementary professional education in the field of health care, particularly nursing.

In 2010, a conference 'Enhancing Competence for Patient Safety' was held at Levi, in Lapland, Finland with participants from the higher education institutions of the network. The conference received wide interest from simulation developers and attracted a high number of participants from around Europe.

Contents of the Book

This publication represents the will to develop simulation education. The purpose of the publication is to make visible the new kind of learning conception that supports achieving patient safety in nursing practice.

The book consists of three chapters. The first chapter observes the pedagogic foundations of simulation education from a theoretical perspective. The second chapter describes simulation development, various implementation models and good practices. The third chapter summarises examples of actual simulation implementations that were presented in the posters in the seminar at Levi.

References

Argyris, C. & Schön, D. A. (1978) *Theory in Practice* San Francisco: Jossey-Bass.

Gergen, K. (1997) 'Social constraction and educational process', in Stefan, P. & Gale, J. (ed.) *Constructivism and Education,* Hillsdale, Erlbaum.

Hale, T. & Ahlschlager, P. (2011) SIMULATION SCENARIOS, for Nursing Education. Delmar, Cengage Learning. Cengage Learning products are represented in Canada by Nelson Education, Ltd.

Johnson, D. W. & Johnson, R. T. (1987) *Learning together and alone. Cooperative, competitive and individualistic learning,* Englewood Cliffs, N.J.: Prentice-Hall.

Kolb, D. (1984) *Experiential learning. Experience as the source of learning and development,* Englewood Cliffs, N.J.: Prentice-Hall.

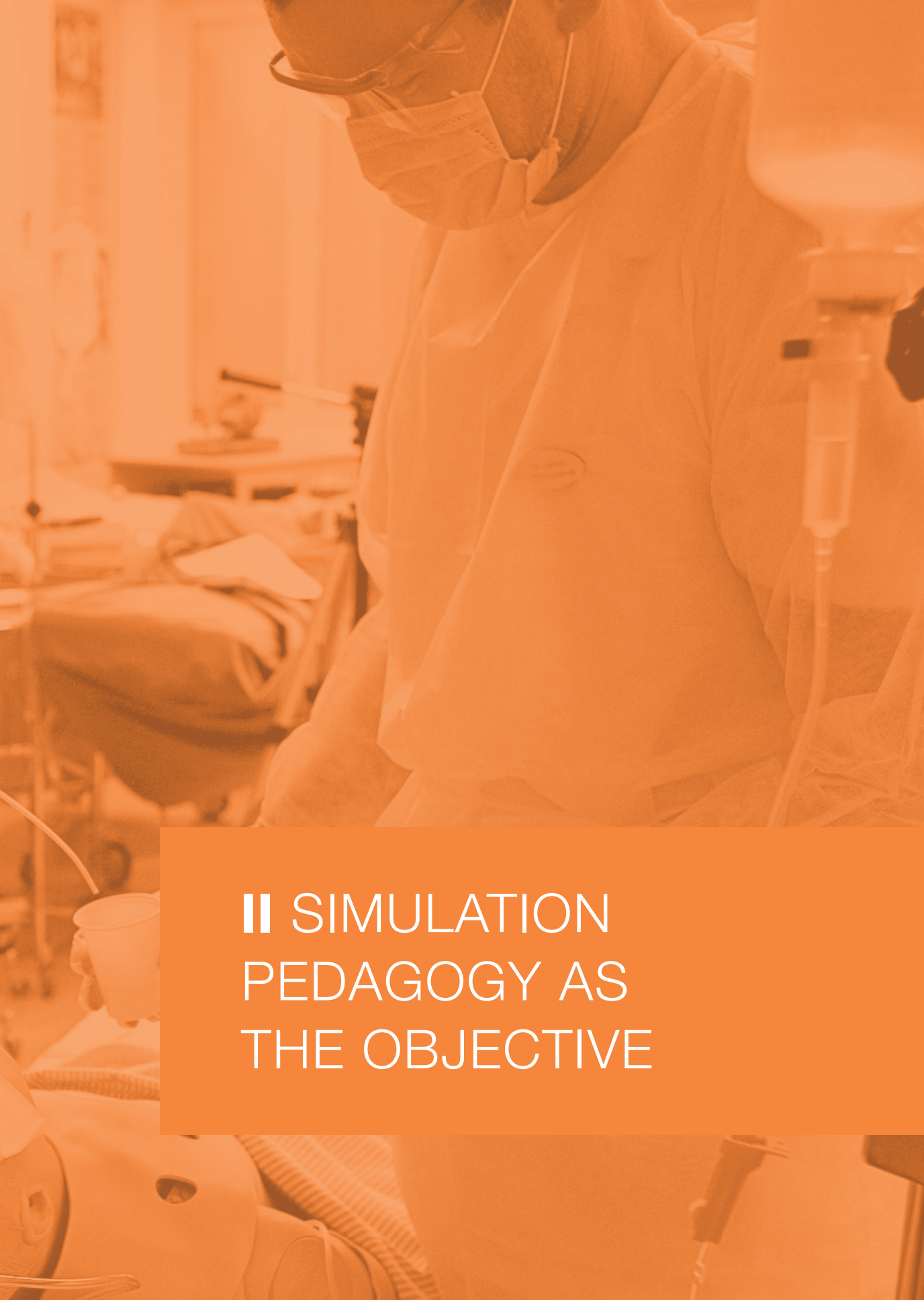
Lave, J. & Wenger, E. (1991) *Situated learning: legitimate peripheral participation,* Cambridge: Cambridge University Press.

Nehring, W. & Lashley, F. (2010) *High-Fidelity Patient Simulation in Nursing Education. Library of Congress Cataloging–in-Publication-Data,* Printed in USA.

Poikela, E. & Poikela, S. (2006) 'Developing Context-Based Assessment within the Framework of Problem-Based Learning', in Poikela, E. & Nummenmaa, A. R. (eds.) *Understanding Problem-Based Learning,* Tampere: Tampere University Press.

Poikela, S. (1998) *Ongelmaperustainen oppiminen – uusi tapa oppia ja opettaa?,* Ammattikasvatussarja 19, Hämeenlinna: Tampereen yliopiston opettajankoulutuslaitos.

Sosiaali- ja terveysministeriö (2009) Edistämme potilasturvallisuutta yhdessä. Suomalainen potilasturvallisuusstrategia 2009–2013. *Sosiaali- ja terveysministeriön julkaisuja 2009:5.* Helsinki.



II SIMULATION PEDAGOGY AS THE OBJECTIVE

Knowledge, Learning and Competence – The Boundary Conditions of Simulation Pedagogy

➥ ESA POIKELA

The common conception is that when a novice and a master meet at the workplace for the first time, the master might ask the novice: *"you can handle the theory but can you handle the practice?"* This indicates the clear distinction between the recently graduated novice and the experienced professional. Education provides knowledge but only work generates competence. Nowadays, the novice could present the question the other way round: *"you can handle the practice but can you handle the theory?"* Few novices have the courage to ask the question from an expert but the question demonstrates what competence at contemporary workplaces is about. (Poikela 2008.)

Work is becoming more conceptualised as it becomes more complex. Work requires oral and written communication, co-operative problem-solving and situation assessment and anticipation. Working in jobs that contain mere routine tasks is becoming rare and even more people are required to be on top of the knowledge-related aspects of their work and to keep learning new things. An increasing number of people have to establish a business due to the decreasing number of steady employment opportunities and changes in vocational positions. In these conditions, producing the competence required in work and in a profession is the profound problem that makes one ask how the conceptual and practical competence of the expert or the entrepreneur could be ensured better during the education?

Several reports indicate that higher education is providing thinking, operational and practical skills required in work life inadequately. University education, for example,[2] meets the competence requirements of working life only in 4 of 23 competence areas. University graduates feel competent in the theory of their professional field and foreign languages. In 19 competence areas, however, there is more or less need for improvement.

The biggest need for improvement is experienced in communication skills, including negotiation, presentation, group-working, oral communication in Finnish and other social skills. The education is insufficient in providing learning skills, such as problem-solving skills, creative thinking, learning abilities and information retrieval skills. The teaching is poor at providing students with competences, such as knowledge on legislation, financial planning, information and communication technology and practical skills. It is also felt that the education is not providing sufficient management skills, such as organisation

[2] According to alumni who had been in working life for five years (Työelämä- ja rekrytointipalvelut 2007; 2008).

and supervision, project management and business knowledge. Organisation and coordination skills and the ability for personal development are in particularly high demand. (Poikela 2011.)

Simulation is a method for pursuing practical thinking and operational competence especially in vocational fields in which safety plays an important role. For example, flight simulation is a necessary part of pilot training as patient simulation is in the education of physicians. Simulation could be utilised as a pedagogic method also in other professional fields in which achieving the core work-related competence efficiently already during the education in comparison with previous methods would be beneficial.

At the same time, pedagogy needs to be critically reviewed. What kind of knowledge, learning and vocational basis should a working-life-centred education be built on? What kind of educational boundary conditions need to be met in order to promote action-based pedagogy?

Knowledge on Theory, Praxis and Experience as Starting Points for Learning

According to the commonly held conception, there are only two kinds of knowledge: theoretical and practical. This dualistic conception of knowledge is rooted deep in Western thinking and its origins can be traced back three centuries to Cartesian philosophy. It is not only about separating theory from practice but distinguishing the mind from the body, thinking from doing and the abstract from the concrete as well.

The dualism of theory and practice is expressed in various other ways as well, such as in the juxtaposition between propositional knowledge and procedural knowledge, declarative knowledge and practical knowledge or symbolic semiotic knowledge and material service knowledge. Conceptual knowledge is assumed to reside both in the mind of its user and in theoretical texts. Practical knowledge, respectively, is presumed to be included in both the object of the action and the action itself. On one hand, thinking is regarded as theoretical and the theoretical is considered as thinking; on the other hand, the experience is regarded as the practice and the practice is considered as the experience. The problem is to distinguish between the knowledge that the individual has and the knowledge that is outside the individual.

Education is also organised according to a traditional epistemological view. Before, the scarcity of theoretical and conceptional knowledge made symbolical knowledge a value in itself and forced students to seek knowledge and the knower. Nowadays, when there is no shortage of knowledge it has lost its value *per se* and knowers have lost some of their authority. Therefore, knowledge like any artefact or work equipment has utilitarian and usage values, which depend on the usage and applicability of the knowledge. This indicates that conceptual tools and material tools are equally valuable.

The notion of use value leads to ontological questions concerning the existence of knowledge. Where does knowledge exist and whose possession is it in? What kind of knowledge resources exist and how the different states of knowledge can be distinguished? Most epistemological classifications do not make the distinction between the *objective* knowledge that is outside the individual and the *subjective* knowledge that the individual has. Since the objective world and the subjective world are not distinguished from each other, experiential knowledge is not defined as a separate dimension. As a consequence, in the dualistic conception of knowledge there is no significance in separating practice and experience and only theory and practice matter.

Japanese academics Nonaka and Takeuchi (1995) make a distinction between explicit (visible) and implicit (tacit) knowledge. They also state that knowledge can be possessed by a person, a group or an organisation in different ways. In other words, knowledge has always a location and is always in someone's possession. They define tacit knowledge as part of the individual's subjective experiential knowledge and competence. Tacit knowledge can also be possessed by a group or an organisation to the extent that the amount of implicit knowledge within the organisation is multifold compared to the amount of explicit knowledge. From this point of view, knowledge has three dimensions instead of two and theory

and practice are included in the *objective* realm of knowledge outside the individual and experience is included in the individual's *subjective* realm of personal competence.

Figure 1 presents the time- and context-related shift that takes place in learning. In addition to requiring education to produce vocational competences, more attention is being paid on how learning continues in work and how the verbal and non-verbal knowledge of competent professionals is taken into common use. The knowledge must be accessible to novices when they begin working in order to support their learning and professional development. Evaluation connects the knowledge back to education, which enables the development and optimisation of the correspondence between working life and education.

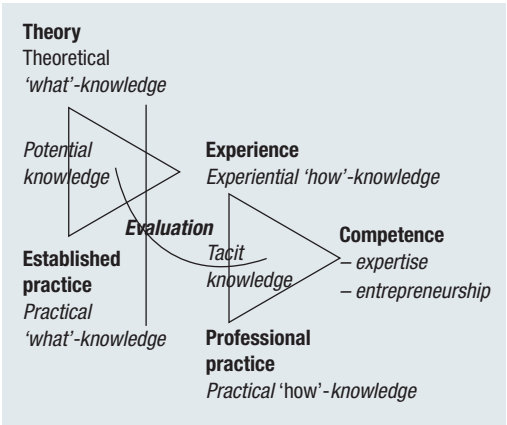


Figure 1. The knowledge base for achieving competence (Poikela 2008; 2011)

Figure 1 depicts a process through which *information* is converted into *competence*. Information refers to any piece of knowledge that the individual discovers via his/her sense organs. Theoretical knowledge is the information that is converted into a conceptual and symbolic form and becomes meaningful to the individual only by processing it. Practical knowledge is manifested by concrete things, such as a machine in which knowledge is in a materialised form or an ant colony as part of the environment, i.e. organic and ecological knowledge. As theoretical knowledge, practical knowledge requires processing, because artefacts and organisms cannot be understood without observation, concepts and experimenting.

It is important to acknowledge that experience does not equal practice, as is often thought. A theory can be in books, in information networks and possessed by experts as practice can exist in artefacts, in the environment and in unique situations. Books can be closed and situations can be left behind. The only internalised thing that a person can take with him/her is experience. Thus, the priority in learning is to ensure that experiential knowledge is formed in a meaningful way. Instead of sharing knowledge and practising, pedagogy must create the prerequisites for creating valid experiential knowledge that integrates theory and practice.

Knowledge is no longer categorised only into 'what'- and 'how'-knowledge but into theoretical 'what'-knowledge, practical 'what'-knowledge and experiential 'how'-knowledge and also practical 'how'-knowledge (see figure 1). From an educational perspective, theory, practice and experience are completely different concepts. Replacing the dualistic way of thinking (theory and practice) with the three-dimensional conception of knowledge (theory, practice and experience) leads to the re-evaluation of the foundations of pedagogy. Integrating theory with practice based on the subject matter in education is not enough. One must ask how learners' individual actions and co-operation could produce experiential knowledge with sustainable quality that would direct and support widely differing vocational futures. Learning continues at work and in the profession (experience, professional practice, competence) whether its objective is an expert's qualification or entrepreneurship that reaches out far into the future.

Potential Knowledge and Learning

The notion of potential knowledge by Ståhle and Grönroos (1999) (see figure 1) refers to objective knowledge in the sense that it has not been yet transformed into the competence of the individual or the community but is nevertheless the objective of goal-oriented thinking and action. This action is commonly known as learning and is considered formal in an educational context and informal in a work context. Individuals do not merely adopt knowledge and skills but share and receive social,

vocational and organisational knowledge that is converted into personal competence through personal and shared learning.

People cannot adopt, select, process or evaluate information, because its meaning cannot be understood by receiving knowledge alone. In addition, mere doing does not enable internalised learning. Actions and words need to have the meaning that is extracted before facts and techniques can be internalised permanently. As the meaning cannot be given, the individual must create it in his/her mind. The meaning produced by earlier education and experience is limited to the *individua*l attachment of meaning and is sufficient as long as the subjects to be learned are perceived as motivating.

The limitedness of meanings becomes apparent when learning difficulties begin. When there are no meanings it is difficult to conceive what a new subject is about, what it is related to and how it can be used. If a person does not understand a meaning, a normal reaction is to ignore and forget the matter. In order to learn new things, new meanings need to be created and this is carried out through the *social* attachment of meaning. Indeed, it is commonplace that upon recognising a word or a phrase and failing to understand it one asks others to explain. Studying is most efficient when the situation involves others who feel the same uncertainty and the same challenges and the joy of learning.

Multilateral *communication* helps in creating a meaning, directing knowledge retrieval towards the right aspects, ignoring the irrelevant and choosing the relevant from surrounding knowledge potential. Therefore, communicative and co-operative groups, communities and forums need to be established to support meaning creation. In education, this means the increased utilisation of learning methods pertaining to teamwork, project-based work and the problem-solving process.

Tacit Knowledge and Competence

Experience that integrates theory with established practice and professional practice that trains experience are crystallised as competence (see figure 1) and is measured by accomplishment and results. Tacit knowledge is about refining individual and shared competences through repetition and reflection onto ever-higher levels towards becoming a top professional. Athletes, for example, demonstrate their competence publicly every time they compete in front of spectators. In addition, they give test demonstrations of their competence for themselves and their coaches.

The following example is taken from Formula 1 racing, in which adult males drive approximately 70 laps on the circuit per race and usually the winner is determined by the performance of his car and perhaps his skills. From the perspective of an informed layman the concept of the race is boring and ethically dubious. The perspective of the racing car driver is entirely different, as indicated by the following comments of a former F1 world champion Mika Häkkinen after his victory of the Spanish Grand Prix in Barcelona in 2000 when a reporter had asked whether he felt that this was the turning point in the battle for the world championship[2]:

'That is a good question. I think the situation was a bit similar last year. It was when I also said that this GP felt like the turning point to some extent. At the time, we achieved better reliability and began understanding our car more. After that we were highly competitive for the rest of the season', Häkkinen replied.

'This weekend we got a great deal of knowledge about our car. I am now much more confident because I and our engineers know much more about this car that is difficult to drive and because its reliability in the race is excellent.

I am not even going to try to explain what it means to learn new things about the car. All that I am saying is that learning those things in a race is completely different from learning them in a test.'

The quote suggests that the driver obtains car-related knowledge that the engineers who have built the car cannot provide him with. The obtained knowledge depends on the situation and context. A competitive situation provides different knowledge in comparison with a test situation.

[2] 'Luotettavuus löytyi vihdoin', ***Aamulehti*** 8 May 2000; translation of the original direct quote in Finnish

His ability to 'read' the car depends on his competence. More specifically, he seeks knowledge about the relationship that is established between the personal driving competence, the car, the situation and the setting. This *relational knowledge* can be regarded as part of tacit knowledge and it is the result of the ability to simultaneously observe all the aspects that affect the situation.

By using the expression 'I and our engineers' Häkkinen points out that he is not alone on the circuit. The outcome of the race depends on the performance of the whole team and its ability to adjust and improve the properties of the car. *Team relationship*, i.e. the relationship with the engineers and the team, is at least as significant as the relationship with the work equipment, i.e. the car. Therefore, tacit knowledge is related to the competence that is shared within the team. Häkkinen also refers to reliability, which is based on an *organisational relationship*, the ability of the formula racing team to build a car that is reliable in tests and, most importantly, in races, during which anything can happen. Race performance is eventually what matters and everything must go right in the race.

The situation resembles working in the cockpit where pilots are not working alone or competing but operating as a team in order to ensure the safety of the flight (Hutchins 1995). The flight crew need to make observations and decisions quickly concerning the take-off, the flight and the landing based on their skills, the information from various metre displays and the observations regarding the turbulent environment in the air. The cockpit functions as an interactive, redundant system and is about interaction in an observation and measurement setting that informs the actors in the immediate situation for the next situation and objective.

The competences of individual actors are not most essential compared to how the operational situation produces the new knowledge and decisions according to which the cockpit functions as a system. Hutchings uses a term *'the memory of the cockpit'*, which does not refer to the knowledge of pilots or even to the shared knowledge of pilots. The cockpit itself is a knowing and competent subject. In accordance with Hutchin's view, the cockpit of a car can also be considered as a knowing subject for a very short time. The only difference is that the human part of the knowledge-generating system is in deciding situations operating as an individual and not as a group.

Similarly, the demonstration and assessment (cf. figure 1) of vocational competence can be considered as an event that is related to the task, the situation and the context. The demonstration of competence can be organised as a test, in which all factors that may distract the performance have been removed to enable measuring the aspect in question. In the test, the only factors that may distract the learner are the assessors. If the learner is unable to block the assessors from his/her mind, concentration becomes difficult and the performance will be negatively affected. The demonstration of skills can also be organised in an authentic situation or a simulated situation so that the demonstration is exposed to any distractions that are possible in the work context but also provides the opportunity to discover new possibilities.

In addition to concentrating on the demonstration of skills, the learner must observe the setting for the events that might prevent or distract the demonstration. The learner must be able to reflect on his/her performance before, during and after the demonstration. From the point of view of producing assessment data, the competence test is a complicated event, because the knowledge obtained from the test is equally dependent on the measurer, the measurement scale and the person whose competence is being measured. It is impossible to obtain entirely reliable information. Thus, the competence test result is only an approximate value and depends on the test situation and the context in which the test is organised.

The students of any vocational field must learn the variety of knowledge and skills on which their expertise will be based. However, no educational programme produces 'complete' professionals but novices whose vocational development continues towards expert-level competence. As learning continues, it gradually becomes more context-dependent and in this process information and knowledge have a special purpose. Information carries meaning, knowledge indicates the context and learning provides the prerequisites for retrieving, reading, selecting and converting into personal information and competence in the operational context. (Poikela 2008.)

Learning Environments and Learning Spaces

The concept of *learning space* can be traced back to Lewin's (1951) field theory and to Kolb and Kolb's (2008) view on spaces of everyday living. A learning space refers to the comprehensive, psychosocial and subjectively experienced environment in which the individual lives and operates. This view is complemented by Bronfenbrenner's (1977) ecological theory on human development stages and system-related levels. The microsystem (such as a class-room), the mesosystem (such as a school environment), the exosystem (such as an education policy) and the macrosystem (such as a cultural and educational system) provide the framework for studying the experiences and development of the learner that are affected by the social system and its actions.

Vygotsky's (1978) theory on action and the zone of proximal development and Lave's and Wenger's (1991) theory on social and situational learning widen and deepen the conception according to which the spaces of living and doing are not merely the physical, material and concrete places where learning takes place. Mental, social and cultural spaces also affect the formation of the experience of the individual and, therefore, learning.

According to Nonaka's (1994) theory on the conversion between explicit and implicit knowledge, the group is the subject in creating knowledge. The stages of knowledge processing (socialisation, externalisation, combination, internalisation – the SECI process) are performed in the spaces of physical, mental and virtual interaction that are referred to as *ba* spaces (Nonaka & Konno 1998), in which people work alone, in pairs or in groups. It is relevant to create the space, the time, the place and the situations which enable the production of knowledge, learning and competence.

Figure 2 depicts the zones of learning, which can be defined as the learning environments that are either *physical* (e.g. a workshop or a class-room), *social* (e.g. the form of a group, communication relationships) or *cultural* (e.g. the customs of a workplace or a professional an organisational culture). Environments determine the context and help to focus on the objective of learning and on which conditions it can be achieved.

In the physical environment, learning may primarily be focused on training spatial practices

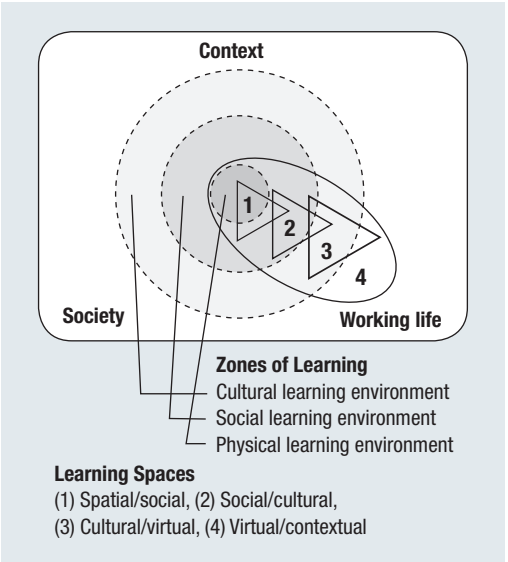


Figure 2. The zones and spaces of learning (Poikela 2010)

and studying mental models, as well as developing social skills. The significance of the social environment highlights social capabilities and is related also to the creation of mental models, while the material practice has an impact on learning in the background. At the core of the cultural learning environment are the principles, facts and beliefs pertaining to procedures, artefacts, values and ethical reasons. Therefore, the zones of learning that depict different environments provide the background and define the space that enables learning. Since environments are unrestricted, the narrower concept of learning space, that is more suitable for planning, is needed for research and development. (Poikela 2010.)

Learning spaces are located at the borders of learning zones. In the *spatial-social* learning space (1), the functional and social relationship of learners with the subject, equipment and other actors is crucial. This raises the question of what kind of architecture of space, functionality and use of senses does the spatial and social learning pertaining to work and the vocation require. From the point of view of simulation-based learning, creating the physical or spatial-social space is of the utmost importance.

In the *social-cultural* learning space (2), the most essential thing is to learn to face different operational and thinking models, to work with different people

and to solve even ethically challenging problems. The significance of emotions and feelings must also be observed. The main question is what kind of thinking, reasoning, co-operation and problem-solving skills are required of the professional in the varying conditions of work in the future. Thinking, decision-making, interaction and ethics are key learning themes in the utilisation of simulation in the social-cultural space.

The *cultural-virtual* learning space (3) establishes a connection to the world of unlimited information and knowledge, teaches working in the network space which is independent of time and place and teaches the learner to study topics with people who he/she has never met. The question is what kind of information and media skills, ethical skills and skills for using, creating and evaluating knowledge will the professionals and the global actors of the vocational field need more in the future? The cultural-virtual space opens the window to the world of unlimited knowledge in order to support simulation-based learning and teaching.

The virtual-contextual learning space (4) as a teaching technology and a simulation tool is designed for the development needs of knowledge retrieval and creation, maintaining interaction, reflective problem-solving and critical evaluation. It differs from the other learning space types in that its spatial, social and cultural factors must be restructured and reproduced.

Simulation-virtual technology creates unprecedented possibilities for developing learning environments and spaces. The fundamental question is what kind of new spatial, social and cultural practices the network and networks produce and how they contribute to creating realistic learning environments or support learning that takes place in an authentic environment possibly even on a different continent.

Guiding Learning in Space and Time

The utilisation of space as a supporting and directing learning resource is a very experiential thing from the perspective of the learner. Learning that takes place in a space can be observed using the experiential and reflective learning theory. Reflection is the core of learning and the key to directing the learner and understanding evaluation. Kolb (1984) states that reflection is the observation and analysis of experiences by the learner alone and together with other learners and with the instructor.

The concrete experience is both the starting point and the result of learning, which is the consequence of the cyclical process occurring in time and place. The relationship between the reflective observation and the external actions of the learner, i.e. the active experimenting with the learned content, is tensioned. The purpose of the tension is to maintain learning by doing and thinking. Reflection is followed by conceptualisation, which may be performed by combining earlier knowledge with new knowledge. The relationship between conceptualisation and preceding and future experiences is dialectical, which increases the motivation for and the commitment to learning. New experiences are the result of action and experimenting and they enrich, deepen or renew preceding experiences and create the new starting point for the deepening progress of the cycle.

Kolb has been criticised for taking reflection into consideration only partly and merely as one stage of the cycle. Schön (1983) points out that reflection is connected to action, since there are always interruptions and situations in action that give time for thinking. Therefore, it is possible to reflect *on* action and *in* action. According to Boud et al. (1985) and McAlpine et al. (1999), reflection can be carried out at the conceptualisation stage, which refers to the mental and careful reflection *for* action. This enables the specification of

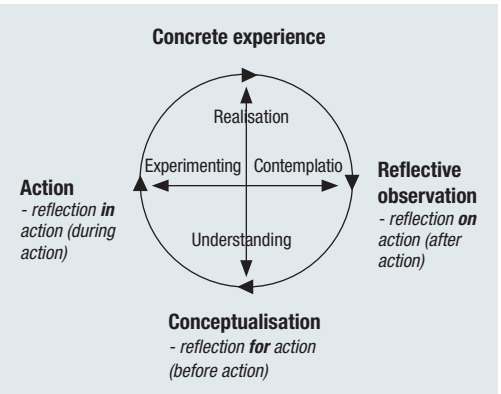


Figure 3. Experiential and reflective learning (Poikela 2010)

experiential learning (see figure 3) by adding reflection to its every stage of learning production.

Mezirow (1981; 1991) has defined reflection, reflecting and reflectivity the most comprehensively. He considers reflectivity as the prerequisite for learning. Reflection begins by perceiving and identifying affections, emotions and feelings and proceeds to the forming of concepts and to the level of theoretical reflectivity. At its simplest, reflection needs not be conceptual thinking but it can be the identifying perception of an emotion, feeling or reaction, from which reflection proceeds further to the levels of conscious, conceptual and critical thinking. Reflection is directed at the learning content and operational processes and the knowledge structures, assumptions, values and beliefs that affect action.

Critical reflection can lead to the *transformative* level of learning, at which the meaning schemas and perspectives of the individual can change. Meanings and meaning structures guide knowledge retrieval, learning, development and action during the life of the individual. When learning and competence production are conceived thoroughly as reflective processes the instruction needs to be transparent and supportive towards the reflective learner. Therefore, *reflective guidance* is based on the stages of reflection in the experiential learning process (reflection *on, for* and *in* action, cf. figure 3).

In the '*on*-stage' of the learning cycle, reflection requires from the instructor the ability to activate the thoughts and the knowledge pertaining to the experiences of the learners and to be aware of the effect of guidance and feedback on the student at the emotional level. In the '*for*-stage', one of the most relevant tasks of the instructor is activating the learner for seeking sources of new knowledge, for planning and for coming activities. The most essential components of reflective guidance in the '*in*-stage' are learning situation observation, organisation, giving advice and learning atmosphere creation. Most of all, instruction is about facilitation, support and helping – not teaching.

The essence of instruction is the development of the *reflection skills* of learners, which includes reflecting on one's own actions, providing and receiving peer feedback, feedback discussions with the instructors and setting results objectives. In addition to the assessment performed during the process, quality criteria and numeral indicators are needed in order to verify the learning outcomes and the competence quality level. Students need constant knowledge on their learning results and their level of competence. This requires clear indicators and qualification standards, which can be used as proof of competence for working life.

Unlike in linear chronologically progressing planning and action, the conception of time in learning is cyclic (cf. Lefebvre 1991). The essence of the cyclic time conception consists of learning, instructing and leading that is performed in time and space. Thus, education and learning have their time, space, place and situation, which enable the development and changing of individuals and groups. Instead of producing education as a product that has value in itself, it is more necessary to produce the space for learning, which in turn enables progress or the production of expertise. (Poikela 2010.)

Organising Learning Around Problems

The learning that takes place in the job, at the workplace and in the work organisation, is often described as a cyclic and spiral problem-solving process. In their theory of organisational learning, Argyris and Schön (1978) use learning cycles with one, two or multiple cycles, which can be regarded as feedback loops at various levels, represent *rational problem-solving* and produce learning by changing the behaviour of the individual. Single-loop learning refers to the feedback loop in which the problem that occurs during action is simply fixed by using the feedback. Double-loop learning functions at the strategic level and refers not only to solving problems in the work of the individual but also to developing the procedures of the work organisation as a whole. Deutero-learning depicts the ability of the organisation to define its problems and organise learning effectively depending on the quality of the problem.

The theory on action learning by Revans (1982; 1983) is also based on the cycle of problem-solving but requires the understanding of the *social aspects* of learning. In addition to the individual, the learning community can be the learner and its members can seek support from the community for learning. The Revan's formula

for action learning[3] L = P + Q shows that learning is the result of programmed knowledge and questioning. The formula includes a time factor, in which P refers to the knowledge that has been learned earlier and Q to the questioning, seeking and obtaining of new knowledge.

Revans makes the clear distinction between solving routine problems and creative problem-solving. The distinction can be seen in the approach towards knowledge and learning. The experts who solve routine problems rely on previously-gained knowledge and update their knowledge but rarely learn completely new things. Creative problem-solving on the other hand requires risk-taking, continuous obtaining of knowledge and learning, which is the foundation of dynamic leadership or entrepreneurship. (Ibid.)

Nonaka's (1994) contribution to problem-solving and to the sociality of learning is *knowledge creating*, which Nonaka describes as the phases of the SECI process[4]: socialisation, externalisation, combination and internalisation. The starting point for creating knowledge is the problem or the development challenge that is based on the utilisation of existing tacit knowledge that is difficult to perceive and its combination with new knowledge in order to create highly usable knowledge for the organisation. Nonaka describes the creating of organisational knowledge to a large extent in Kolbian terms (cf. figure 3): *experience exchange* (concrete experience), *collective reflecting* (reflective observation), *the linking of implicit and explicit knowledge* (conceptualisation), *learning by doing* (active experimentation). The main difference is in that here knowledge is processed by the group while Kolb depicts learning by the individual.

Problem-Based Curriculum

Education does not rise only to the current challenges of working life but also to the challenges of the working life of the future because professionals need to be able to adapt their competence to changing tasks and even switch to another profession or establish a business. Problem-based pedagogy provides the tools for planning curricula that meet the requirements of working life. Instead of subjects, learning is based on the problems of working life as carefully-planned scenarios, cases and triggers.

Planning the curriculum to meet working-life requirements is not merely about using problems as the basis for learning but meeting both contemporary and future competence needs. (Poikela 2006; 2011.) In addition, problem-based pedagogy is a strategy, a pedagogy that is closely connected to working life and that is structured

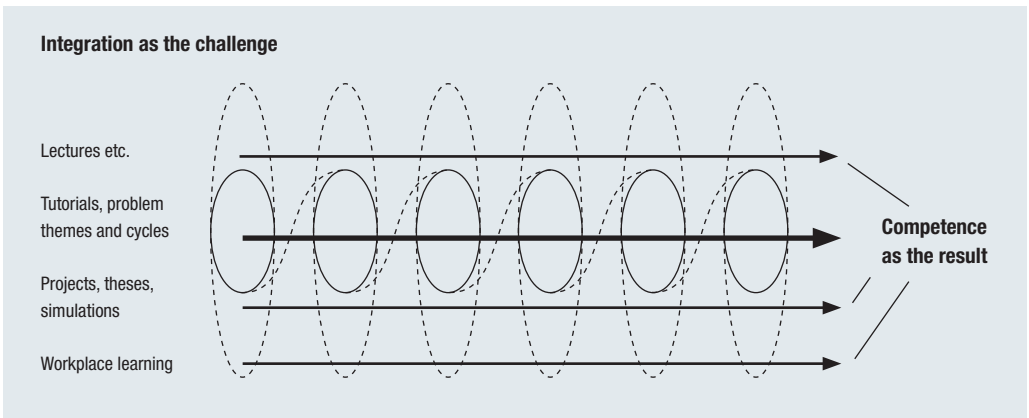


Figure 4. The process of the problem-based curriculum (Poikela 2011)

[3] L (learning) = P (programmed knowledge) + Q (questioning).
[4] The phases of knowledge processing and learning by the team: S (socialization) – E (externalization) – C (combination) – I (internalisation).

around challenging learning that requires creative thinking and takes place during tutorials[5].

For teachers, the curriculum is a process that navigates the coordination and assessment of learning as well as leadership and development and a process that requires continuous co-operation with other actors. Teaching and learning individually is being replaced by co-operative work methods and approaches. For students, the problem-based curriculum offers the setting for information, knowledge and learning in which they participate, function and think actively in order to produce their competence. At its best, it is a versatile working environment that takes the time, the place and the situation into consideration and that includes the physical, social and virtual spaces that have been created and in which also simulation can be utilised optimally (see figure 4).

The problem-based curriculum is organised around the problems and problem themes that produce core skills (e.g. academic or general skills), which means that the time, the place and the situation-specific factors of problem-solving are taken into consideration. Since the lectures and exercises pertaining to subjects and other working methods are produced outside tutorials they need to be scheduled, thematised and adapted to the requirements of problem-solving. After the adoption of problem-based learning (henceforth abbreviated as PBL), the amount of contact teaching tends to decrease because students are encouraged to seek themselves a large proportion of the knowledge that was previously given in lectures. (Poikela 2010; 2011.)

A new solution is needed for the appropriate scheduling and content-related allocation of theses, projects, simulation and learning in working life in the PBL curriculum. The virtual learning platforms that have been utilised in web-based studies provide new possibilities for reaching the solution (e.g. Kärnä 2011). The function of the curriculum is not merely to provide the operational setting for learners but the physical, social and virtual space in which all the factors that facilitate learning have been anticipated, defined and planned as well as possible.

The Educational Boundary Conditions for Simulation Pedagogy

Education systems have traditionally been developed from the perspectives of all-round education and professional training. The demand for offering entrepreneurial training studies within general education and professional education has shifted the perspective. At the same time, the distinction between general and professional expertise has been described as a line in the sand. Is it necessary to start talking about "entrepreneurial expertise" if we still want to distinguish between professional and general expertise?

The supporting of active citizenship in order to ensure democracy is the current topic throughout Finnish society. At workplaces, citizenship is replaced by the organisational or entrepreneurial citizenship that can be related to employee rights and duties and also to work community skills, i.e. subordinate skills and their counterpart management skills. Since it is difficult to place entrepreneurship on the line segment that represents the continuum between general and professional education the simplest improvement is to add an entrepreneurial education dimension to the model (see figure 5).

Thus, the line segment is replaced with the triangle model consisting of general, professional and entrepreneurial education. The model reorganises and provides the three-point framework for reconsidering the development of the general abilities that are needed in working life, necessary professional skills and the strategies that support expertise and entrepreneurship.

The processes of learning and development cannot be standardised or repeated as such as they have to be reproduced with each new group and student. 'Learning by making' forms the core of the action-based pedagogy that utilises

[5] The tutorial is the dynamo of PBL, a group of 8–10 students who meet approximately once a week and are instructed by a tutor teacher. The PBL cycle is the basic state of ***epistemic*** working (cf. Schaffer 2004), which teaches thinking, communication and co-operation skills and builds the identity of the professional.

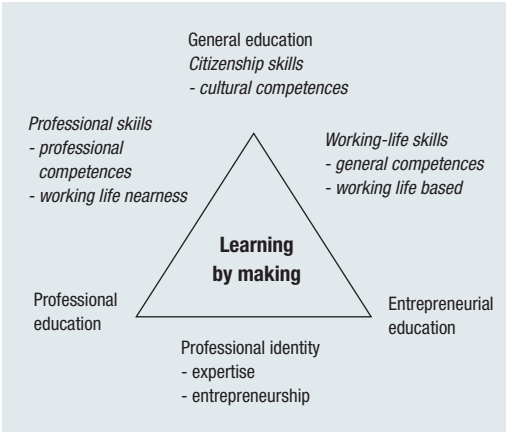


Figure 5. The boundary conditions of action-based pedagogy (Poikela 2011)

simulation[6]. Each student solves problems and simultaneously gathers, processes, creates and shares knowledge to support his/her and others' learning. The result of learning can be a product, a service, a culture-related artefact or simply the learning outcome that is manifested as new skills and as changed behaviour and thinking. Also the assessment of competence requires the functional connection that is based on the demonstrations of skills and the assessment criteria that have been determined mutually. (Poikela 2011.)

The master and the novice that were mentioned at the beginning of the article are both right. The novice needs to learn the practical core skills already during the education. The professional needs to learn to manage his/her work at the conceptual level in order to share his/her competence with peers or to introduce novices to their work. Pedagogy is returning to workplaces as in the old apprentice-journeyman-master model but with the added theoretical aspect of work, while work is taken more seriously in educational institutions. Learning is work that is guided and led on the basis of the pedagogy that is closely connected to working life and from the premises of the curriculum that is based on working life.

The wider use of simulation to support learning and the development of the basics of simulation-based learning and teaching show that the gap between work and education is becoming narrower. The challenges of simulation-based pedagogy are related to the development of future professionals, to the renewal of the communicative, social and technical practices of work and the work organisation and to the solutions that make use of both the society and working life. In the future, it is likely that simulation-virtual inventions will be made that push the envelope of conventional instrumentalism[7] and reach pedagogic development and the level of practical and critical knowledge interests.

References

'Luotettavuus löytyi vihdoin', *Aamulehti* (8 May 2000).

Boud, D., Keogh, R. & Walker, D. (1985) 'What is reflection in learning? in Boud, D., Keogh, R. & Walker, D. (eds.) *Reflection: turning experience into learning*, Worcester: Billing & Sons Limited.

Bronfenbrenner, U. (1979) *The ecology of human development*, Cambridge, MA: Harvard University Press.
Habermas, J. (1976) *Communication and the Evolution of Society*, London: Heineman.

Hutchins, E. (1995) 'How a Cockpit Remembers Its Speeds', Cognitive Science, 19: 265–288.
Järvinen, A., Koivisto, T. & Poikela, E. (2002) *Oppiminen työssä ja työyhteisössä*, Juva: WSOY.

Kolb, D. (1984) *Experiential learning. Experience as the source of learning and development*, Englewood Cliffs, N.J.: Prentice-Hall.

Kolb, A. Y. & Kolb, D. A. (2008) 'Experiential Learning Theory: Holistic Approach to Management Learning, Education and Development' in Armstrong, S. J. & Fukami, C. (eds.) *Handbook of Management Learning, Education and Development*, London: Sage Publications.

Kärnä, M. (2011) *Virtuaalisen tiedonrakennuksen tila ongelmaperustaisen oppimisen tukena*, Acta Universitatis Lapponiensis, no. 211, Rovaniemi: Lapin yliopistokustannus.

[6] Cf. learning by making, developing, design and creating with learning by ***being, listening*** and ***watching*** or learning by ***doing, replicating*** and ***practising*** (Poikela 2010).
[7] Cf. the categorisation of technical, practical and emancipatory knowledge interests by Habermas (1976).

Lave, J. & Wenger, E. (1991) *Situated learning. Legitimate peripheral participation*, Cambridge: Cambridge University Press.

Lefebvre, H. (1991) *The Production of Space, (La Production de l´espace*, 1974), Oxford: Blackwell Publishing.

Lewin, K. (1951) *Field theory in social sciences*, New York: Harper & Row.

McAlpine, L., Weston, C., Beuchamp, J., Wiseman, C. & Beuchamp, C. (1999) 'Building a metacognitive model of reflection', *Higher Education*, 37, pp. 105–131.
Mezirow, J. (1981) 'Critical theory of adult learning and education', *Adult Education*, 32, pp. 3–24.

Mezirow, J. (1991) *Transformative dimensions of adult learning*, San Francisco: Jossey-Bass.

Nonaka, I. (1994) 'A dynamic theory of organizational knowledge creation', *Organization Science*, 1, 5: 14–37.

Nonaka, I. & Takeuchi, H. (1995) *The knowledge-creating company*, New York: Oxford University Press.

Nonaka, I. & Konno, N. (1998) 'The concept of "ba": Building a Safer health System', *Californian Management Review*, 40 (3), pp. 40–54.

Poikela, E. (2011) 'Oppiminen, työ ja osaaminen – haasteena asiantuntijuus ja yrittäjyys', in Pelli, R. & Ruohonen, S. (eds.) *Oppimisen ja osaamisen ekosysteemi. Kymenlaakson ammattikorkeakoulun julkaisuja*, series A, no. 32, Tampere: Tammerprint Oy, pp. 24–33.

Poikela, E. (2010) 'The design of learning', in Ruohonen, S. & Mäkelä-Marttinen, L. (eds.) *Towards a Learning and Competence Creating Ecosystem - LCCE. Publication of Kymenlaakso University of Applied Sciences*, series A, no. 28, Jyväskylä: Kopijyvä Oy, pp. 10–17.

Poikela, E. (2008) 'Koulutuksen ja työn uusi suhde – kohti työlähtöistä opetussuunnitelmaa', in Helakorpi, S. (ed.) *Postmoderni ammattikasvatus – haasteena ubiikkiyhteiskunta*, Hämeenlinna: Hämeen ammattikorkeakoulu, pp. 65–82.

Poikela, E. (2006) 'Knowledge, knowing and problem-based learning – some epistemological and ontological remarks', in Poikela, E. & Nummenmaa, A. R. (eds.) *Understanding PBL*, Tampere: Tampere University Press, pp. 15–31.

Revans, R. (1982) *The Origins and Growth of Action Learning*, Bromley, Kent: Chartwell-Brat.

Revans, R. (1982) *The A-B-C of Action Learning*, Bromley, Kent: Chartwell-Bratt.

Schaffer, D. W. (2004) 'Pedagogical praxis: The professions as models for post-industrial education', *Teachers College Record*, 106 (7), pp. 1401–1421.

Schön, D. A. (1983) *The Reflective Practitioner: How Professionals Think in Action*, New York: Basic Books.

Ståhle, P. & Grönroos, M. (1999) *Knowledge Management – tietopääoma yrityksen kilpailutekijänä, Ekonomia-sarja*, Helsinki: WSOY.

Työelämä- ja rekrytointipalvelut. (2007) *Viisi vuotta työmarkkinoilla. Ura- ja työmarkkinaseuranta Lapin yliopistosta vuonna 2001 valmistuneille maistereille*, Lapin yliopisto.

Työelämä- ja rekrytointipalvelut. (2008) *Viisi vuotta työmarkkinoilla. Ura- ja työmarkkinaseuranta Lapin yliopistosta vuonna 2002 valmistuneille maistereille*, Lapin yliopisto.

Vygotsky, L. S. (1978) *Mind in society: The development of higher psychological processes*, Cambridge, MA: Harvard University Press.

Simulation-Based Teaching in Health Care

↪ PAULA POIKELA

Simulation has been used as a teaching method for several decades. Armies have used simulation in their training since the Second World War, and chess players attempted simulating game situations as early as in the 19th century. The modern aviation industry and Edwin Link were among the first to develop an accurate replica of a cockpit for training purposes. The flight trainer that is known as the Blue Box was invented by Edwin Link and patented in 1929. Link saw that the simulator enabled safer, easier and cheaper flight training. In 1930, Link opened his own flying school, which utilised the flight simulator.

Customer safety was one of the objectives of the Blue Box. No longer it was necessary to practise various situations during flight, as they could be simulated. Soon, it became evident that customer safety was not affected only by technical skills but also by non-technical skills, such as team work, decision-making, leadership and the division of resources and competence, all which had to be at a sufficient level during the flight in addition to technical skills. Another objective of the flight training was adaptive cooperation that ensures customer safety. (L-3 Communications, 2010). This is impossible to achieve without training, but training during a flight jeopardises customers.

During the Second World War, the demand for training pilots quickly for demanding missions was high. To meet this demand, Link continued developing his flight simulator and made other inventions, such as the navigator and fighter pilot simulator and a detailed replica of a cockpit. During the 1950s, the development of analogue computers contributed to the building of more complex simulators. In the 1960s, digitalisation played a role in the development of a simulator for the space industry: The Apollo simulator. The Apollo simulator was the first fully-digital simulator. The simulators designed by the military and aviation industries for educational purposes took great leaps forward every year.

Simulation as the imitation of the reality includes games, imagination and the calculation of physical or other models that depict phenomena of the reality (e.g. solar eclipse). Playing is a significant form of imitating the reality for the human species and certain other mammals. Compared to training in real situations, simulation is often more cost-effective (flight simulator training), safer (nuclear power plant simulator, playing war and war games) and often the only means to obtain information of actual events. In Finland, Hannu Salakari (2007) has studied the use of a harvester simulator in logging education and how the simulator can be used for teaching necessary skills for the logger.

Simulation refers to the imitation of reality. Humans simulate reality in their own imaginative world. Computer simulation has been a significant and growing area of simulation. In computer simulation, artificial reality is created with a computer, and the purpose of this reality is to imitate actual reality as accurately as possible. (Vartiainen, Teikari and Pulkkis 1989).

In this article, I aim at answering why simulation is so good as a learning method.

Simulation Usage in Health Care Education

Medical education was the first field of the health care system to replicate authentic treatment situations and entire processes. Simulation was also used in nursing already a hundred years ago. The teaching application that was used at

the time was a demonstration room. It can be said that pre-simulation in medical area started a hundred years ago, in 1911, when registered nurse Anna Bloomfield established "a demonstration room" (American Journal of Nursing 1916). Real simulation, however, can be said to have started during World War II. Simulation was introduced in a nursing training program. Originally, treatment situations were imitated by apprentices. Later, simulation-based teaching was included in the training of more demanding medical knowledge, skills and behaviour. Traditional disciplines such as mathematics and the simulation of music with synthesizers set the example for the teaching methods. The biggest progress was seen at the end of the 20th century, as patient simulators were improved essentially. Simulation-based training that was successful in the pilot training of the war industry was adopted in health care education.

David Gaba from Stanford University is a pioneer in using simulation in health care. He categorises simulation into five categories:

1. Verbal simulation, i.e. role play. Real patients can be used in this category in order to practice interaction, for example.
2. Anatomical models of body parts that can be used in comparing the normal state and the state of illness.
3. Simple computer-based patients.
4. Complex virtual and computer-based virtual patients that resemble humans and can be used for repeating and training complex interactional health care procedures.

The use of patient actors in neurology education was studied in 1963 in the United States of America. The actors were taught how patients with various neurological diseases act. (Rosen 2008). The experiment faced opposition in the field of medicine, and the report of the experiment was completed in 1964. Stillman, Ruggill, Rutala and Darrell (1980) reported of an experiment, in which a real patient was used in medical education. The reason for opposition was the use of a real person as the object of the education. The research team referred to the patient as 'a patient instructor', but after the experiment patients used for educational purposes became known as 'standardised patients'. The Resusci Anne manikin was the first patient simulator. This innovation was used for teaching and practising resuscitation by health care professionals and laymen. A few years later the first patient dummy intended specifically for health care professionals was introduced at the University of Miami, and the dummy enabled practising resuscitation in the hospital environment and examining the patient. The development of simulators for health care education slowed down for a long time after this.

In the 1990s, four factors contributed to the rapid development of simulators in health care: three-dimensional anatomical models, the touch screen, practising surgical procedures with anatomical models and especially practising endoscopic procedures. In 1986, David Gaba and his team had developed a simulator for practising different types of anaesthesia. In 1988, the same team had introduced a full-body patient simulator. The high-fidelity human patient simulator (abbreviated as 'HPS') can be defined as a computer-controlled manikin that functions in interaction with the simulation trainees in a controlled and simulated treatment situation (Parker and Myrick 2009: 323). The aforementioned developers stated that simulation-based learning is part of the pedagogy of the future in the medical field.

The utilisation of virtual reality (VR) environments has increased the vividness of practise situations significantly. The situations appear realistic and there is no need to imagine the environment. VR is divided into three levels according to immersiveness (Beier 2003):

1) Non-immersive, computer-controlled virtual environments.
2) Semi-immersive virtual environments that are created using a projector, for example. In a virtual environment, the learner can move from one place to another and feel as if he/she were acting in the environment, but the learner is not him-/herself inside the environment.[1]

[1] A good example of a semi-immersive environment is ENVI (the Virtual Centre of the Wellness Campus of the Rovaniemi University of Applied Sciences). The treatment of the patient begins at one of the three different scenes that have been created. The environments are projected onto a screen and the learner can move and interact with virtual people in the environment.

3) Immersive virtual environments, such as the CAVE (Cave Automatic Virtual Environment).

Simulation-based learning was not fully introduced to nursing education before the end of the 20th and the beginning of the 21st century. Nurses have participated in simulation-based medical training also before this, as non-technical skills and processes pertaining to nursing and medicine have been practised alongside with medical competences. The demonstration room, established by Anna Bloomfield in 1911, can perhaps be termed 'pre-simulation'. The purpose of the demonstration room was to enable very busy nursing personnel to gather together and to make demonstrations of complicated nursing procedures. Demonstration rooms are still used in nursing education at the beginning of the 2000s. Demonstrations have not been given up, because there are various nursing skills that can be learned in demonstration rooms, i.e. laboratory exercises. A master–apprentice learning method is used. The concepts of demonstration teaching and laboratory teaching have been replaced by the concept of skills laboratory. Demonstration includes the mental image of learning from an example and practising a particular procedure. There have been attempts to expand demonstrations to entire exercises, but there has been a disconnection between the operation of the student and the wholes in the treatment of the patient.

Medical education institutions have suggested that medical education should adopt subjects that would decrease treatment injuries and increase patient safety from pilot training, such as teamwork, leadership and interaction. In pilot training, these skills are known as 'crew resource management'. Their effect on patient safety should be studied. (Zeltser and Nash 2010).

The Institute of Medicine has suggested that training in team behavior, leadership, communication, and other human factors could reduce medical errors and improve patient safety. Training on such topics has been adapted from teamwork training programs used in military and commercial aviation, called crew resource management (CRM). The principles behind CRM programs have been deployed in a number of clinical settings over the past 2 decades, and there are now several CRM vendors. Little is known about this nascent industry, and the emerging research supporting CRM programs lacks standardization and conclusive evidence. The objectives of this study were to report on the body of empirical data about CRM training in clinical settings and to provide a conceptual framework for evaluating its effectiveness in medicine. Using the proposed conceptual framework, the authors further examine currently published methods of measuring effectiveness and identify future directions for the use of teamwork training in medicine. (Zeltser and Nash 2010).

The report of the Committee on Quality of Health Care in America (2000) highlights the high number of treatment injuries and close-call incidents. The report points out that simulation could be utilised on a wider scale. The adoption of simulation in health care education has brought a new theory of education and practical requirements together. According to Titzeer, Swenty and Hoehn (2011), simulation-based learning has at least three benefits for the learning process of the student. Simulation-based teaching focuses on problem-solving skills, it focuses on multiprofessional co-operation and different roles within the occupational co-operation in health care and learning is based on treatment that is built on research. Galloway (2009) states that when patient safety is discussed already in the basic studies, the simulation exercise cases combine learning and matters pertaining to patient safety in a good way.

The Development of Simulation-Based Learning in Nursing

Nursing education has become more demanding during the last 40 years. One reason for this is the will to find effective teaching methods that enable nursing students to obtain the necessary practical nursing competences and competence areas. Other reasons include limited educational resources for practical nursing, lack of places for practical training and the increasing number of nursing students (Nehring and Lashley 2009). The following paragraphs provide an overview of the milestones in simulation-based learning.

Lees (1874) describes **anatomical models** developed for medicine and also their significance for nursing.

Lees adopted **task-centred teaching**. Lees introduced a mechanical dummy that was suited for practising bandaging, for example. Mrs. Chase, however, was a more significant invention. All contemporary care simulators are derived from it. This manikin was introduced in 1910, and it enabled practising various manual skills (Herrman 1981).

Role play has been used in nursing education (Schoenly 1994; Jenkins and Turic-Gibson 1999) to improve students' social interaction skills and ability for empathy. Role play enables students to test their metacognitive abilities.

In the context of nursing education, **computer games** have been considered as beneficial for decision-making and to differ from role-playing games in theory. Computer games are more goal-oriented and interactional and they provide structured feedback after playing (Ulione 1983). The pros and cons of games have been discussed in nursing education. The benefits include motivating young students, increased theoretical knowledge, efficient studying, the integration of knowledge and skills and training in a safe environment (Corbett and Beveridge 1982; Davidhizar 1977; Clark 1976). According to Clark (1976), the lack of morality of education, i.e. the ethical facing of the patient, is a fundamental disadvantage in computer games. The student is unable to form a personal connection with the simulated patient, and therefore the way of treating the patient is missing from the construction of knowledge.

CIA (computer-assisted instructor) learning is a learning method in which students can study without being bound to a particular time and place. They can safely study using a computer. De Tornyay predicted four decades ago (1971) that computer-based simulation can be used in education. In the 1980s, computer-aided distance learning increased.

The use of real patients has been more common in medical education than in nursing education for years. This learning method requires more comprehensive application of multiprofessional know-how from students, and several studies concerning the method have been carried out due to its ethical aspects. Yoo and Yoo (2003) indicate that students' social skills improve rapidly when real patients are used. Some studies suggest that it does not affect learning in any way whether video-recorded patient cases or real patients are used. (Foley, Nespoli and Code 1977).

Creating **a virtual health care environment** is technically possible. The only obstacles for using it are the high procurement and maintenance costs. Despite the challenges, virtual learning environments have been and are still being developed. In 1983, Philips described the possible use of a virtual environment in nursing education. A virtual application for practising the insertion of a cannula was developed by Merril, Barker and Virginia in 1996. In 2007, Skiba developed an interactive virtual environment that could be monitored from anywhere in the world.

Human patient simulators (HPS) are the spearhead of the simulator development. These simulators are categorised into less-advanced low-fidelity simulators and high-fidelity simulators, which utilise advanced technology (Good 2003). The simulators have been used with good results in medical education by students and clinical workers. Verbal evaluation has been positive and all participants of the simulation exercise have reported learning both in skills-related and non-skills-related areas. However, the effectiveness of the training is difficult to measure. (Brandley 2006).

During 2005–2007, the Rovaniemi University of Applied Sciences developed a simulated learning environment and a virtual environment, which consists of three different virtual and interactive environments. The learning environment enables simulating and training for correct procedures at the scene, during emergency transportation, at an emergency ward or a regular ward and at home during rehabilitation. The simulation-based learning environment developers' perspective on learning has been ahead of its time, and the nursing educators of the Rovaniemi University of Applied Sciences and experts on nursing practices have discussed for a long time about patient safety and how it can be achieved. (Yliniemi 2009).

Simulation – A New Way of Thinking of Nursing Education

The development towards a so-called ubicomp society has changed working life. Ubicomp is an abbreviation of *ubiquitous computing*, which refers

to the integration of information processing into everyday activities. Ubiquitous computing operates in every-day life discreetly and surrounds people everywhere. It does not interrupt the user in any way. It functions as part of the daily routines of people and working life everywhere and all the time. The concept of ubiquitous computing resembles omnipresent intelligence. It means that technology is so unnoticeable that users do not even realise it is present. (Laari 2008). In a ubicomp society, information technology forms also the basis of nursing.

The revolution of nursing is in progress, and new kinds of teaching methods have been adopted in nursing education. It is required that education can be provided anywhere and at any time. The trend is enabled by the rapid development of information technology towards ubicomp nursing education. Life-long learning and employers' interest in a shorter educational path create certain demands for the nursing education. The classroom that once was the place for studying is no more. Pressure from working life has changed the student learning evaluation methods. The evaluation of competences is replacing the counting of points. (Voorhees 2001). The objective of the education is that students learn and achieve the competences needed in working life, instead of displaying mere desired behaviour, i.e. achieving grades. The development of nursing education can be observed as a change in the general philosophy of learning and teaching.

The use of Anna Bloomfield's (1916) demonstration room is an example of *behaviourism* in education. Nevertheless, Bloomfield's method was practical, as the room was located in a hospital and the learners were graduated nursing professionals. Laboratory teaching is still used in basic studies, and the method is still similar to the teaching in Anna Bloomfield's time. The difference is that the students are not professionals and learning cannot be connected to wholes. Before, training and learning of wholes was carried out using real patients in practice. Pavlov (1849–1936) is the best-known scholar of the behaviouristic learning theory. The behaviouristic learning theory entails that the teacher defines and provides the information that the teacher thinks the student needs. The learning situation is planned as accurately as possible, and learning is controlled with tests. The student memorizes various separate aspects but is unable to apply them in practice.

Apprenticeship is a historical method in nursing education, in which the professional teaches the novice (Benner 1884). The professional simulates treatment situations, and the novice imitates the professional. The teaching method includes certain humanistic elements, such as listening to the novice. However, the professional is the one who makes decisions regarding the contents of the education. Therefore, the efforts to create unambiguous evaluation criteria in line with the humanistic learning theory failed, and the criteria for learning was constituted by how well the student imitated the instructor. (Patrikainen 1999). During the 1970s and the 1980s, nursing education began to create wholes, which was related to the biological learning theory. The humanistic learning theory emphasises the internal control in learning. Learning is considered to be largely based on the personal experiences of the learner, and the objective of the teaching is to support the growth and the self-direction of the learner. According to the humanistic learning theory, experientalism, i.e. whether the objectives are considered to have been accomplished, is essential in the evaluation of learning or teaching. A pedagogic operations model is built on experienced actions and ideas. After this, experiences are reflected on, and the received new ideas are conceptualised like a base on which to build new models of thinking. Finally, the practice is experimented on or tested. (Rauste-von Wright and von Wright 2002). Learning was characterised by dialogue and listening. In treatment, this was manifested in process development, and treatment was commenced on the basis of a patient-centred plan. (Eriksson, Isola, Kyngäs, et al. 2007).

The cognitive learning theory opened a new page in nursing education. It provided the nursing student an opportunity to create knowledge structures and re-organise existing knowledge. According to the cognitive learning theory, old teaching methods are inadequate for supporting the student in learning. The apprenticeship method was replaced by the utilisation of broader simulated learning events, which makes it easier for the learner to apply the received information in situations that are similar to the

situation in which the information was learned. Simulation in line with the cognitive learning theory was often performed with real patients, i.e. so-called standardised patients. This was a great breakthrough, since educators assumed that learners process information actively. Information-processing processes form a whole, and the learner can construct mental wholes from selected observations. Simulation as a teaching method has created an opportunity to do this. (Laarni, Kalakoski and Saariluoma 2001: 85–119).

There are differences in the methods of learning among constructivist learning theories. Jean Piaget (1896–1980), for example, saw the learner as the sole constructor of his/her knowledge in a separate learning process. Vygotsky (1896–1934) claimed that the entire group constructs information, and in this process, the teacher becomes an agent of change in information construction. The student is not *tabula rasa* that the teacher fills with his/her knowledge, but an actor who seeks and creates information. (Tynjälä 1999: 36–38). The are several constructivist schools, of which social constructivism views learning in a social, cultural and historical context. Vygotsky (1982) points out that information is not conveyed directly but adopted through action. The nursing student cannot construct information by him-/herself, as other professionals and the patient are always involved. Simulation-based learning is always carried out in a group and never independently. Thus, the information is constructed by the group. The student creates his/her information schema by listening the other members of the group.

Since the 1980s, simulation-based medical education and its effectiveness have been under focus in nursing education. Simulation-based nursing education became a separate topic in the educational development process only in the mid-2000s. (Kneebone, Scott, Darzi and Horrocks 2004). In simulation, the experientialistic learning in which information is constructed is also the basis for patient safety. Standardised patients are required no longer, as information is constructed in simulated nursing environments using simulated patients. In the 2000s, Europe and Finland began focusing also on patient safety and minimising health care malpractices. In 2008, the Council of the European Union decided that the Member States must establish reporting and learning systems concerning adverse events in health care settings. In the following year, Finland's Ministry of Social Affairs and Health (STM 2009) published a patient safety strategy for 2009–2013, which gives recommendations on the effectiveness of the education on preventing treatment injuries and adverse events involving patients. This contributed to the adoption of simulation as a teaching method in nursing education.

The student needs to enter a state of flow while learning in order to maintain a high level of motivation. There are very few studies on the effects of flow on learning. Lehtinen (1989) has studied the use of a computer in learning mathematics and its connection to the flow experience. (Csikszentmihalyi 2000).

Benner (1984) describes learning cases that are based on nursing practices. During Benner's study, the constructivist method of constructing wholes and the conception that the student is able to construct wholes and make decisions based on research were prevailing. The new simulation technology and the new viewpoint towards learning have enabled creating realistic situations and wholes.

A safe setting should be required in education. In compliance with the constructivist learning theory, the student builds new kind of information in the study community, in which the teacher guides the learning. Simulation as a learning method of nursing supports the student to reach flow as a member of the community. During the nursing education, an operational culture that enables the study of and learning from phenomena is created, which leaves no room for a culture of blaming. This is a way of penetrating the "wall of silence" (Gibson and Singh 2003) that may prevent the recognition of situations and the discovery of risk factors within the system. Learning from mistakes is supported by an open and trusting environment, in which mistake-covering and blaming are considered as habits that need to be quitted. This makes it possible to ensure patient safety already during the education.

Planning and Evaluating Simulation-Based Learning

The curriculum creates the framework within which the teacher must work, but evaluation is a

tool that guides the student. In the constructivist learning theory, learning settings constitute how the learner experiences learning. Furthermore, it can be trusted that the learner learns independently and the teacher does not control learning but guides the learning process. The teacher must work in the learning process as a facilitator who evokes curiosity. (Siljander 2005: 214–216). Siljander (2005) states that the actions of the teacher guide the student to search for information and to work independently, and most importantly, the learning settings created by the teacher enable these processes. Simulation-based learning is a method to create an experience-based learning experience for the student. From the learner's point of view, the metaphor of conveying information from theory to practice and the metaphor of information construction in working life are considered the most important. Learning theories do not logically lead to learning principles. Nevertheless, teaching can change, when the basic idea of teaching is a learning theory. The idea underlying simulation-based learning is that when the learner enters flow, both technical and manual nursing skills and metacognitive abilities are transferred into practice. (Sahlakari 2007: 132).

The learner does not learn if, as stated above, the teacher or the facilitator does not arrange the learning setting in a way that promotes learning. The framework for the learning setting is provided by a radical change in the curriculum. The subject-centred, fragmented curriculum must be replaced with a curriculum consisting of wholes. A nursing curriculum can be designed entirely on the basis of real learning challenges and problems arising from working life. Such a curriculum can be termed as a problem-based learning curriculum (abbreviated as 'PBL curriculum'). Teaching nursing requires not only the approved skills of the discipline but also broader reasoning and assessment abilities. According to Cuthberg and Qualligton (1999), one of the most difficult aspects of nursing to learn and to teach is ethical competence. A PBL curriculum provides a sound basis for training this aspect, as ethics can be considered as pertaining to every problem that arises from practice. Furthermore, when simulation is used as a teaching method, learning reaches a new level, i.e. the feeling of flow. New kinds of evaluation methods need to be developed for simulation-based learning. Evaluation criteria must include a social and a reflective dimension, and simulation pedagogy challenges the planners of education to develop the evaluation.

Conclusion

Working-life competences are based on strong knowledge and skills and individual competence. Competence is gained by using new learning methods. In working life it can turn out that it is noticed that the emphasis in learning has been on classroom behaviour and studying and that the nurses lack generic skills. (Poikela 2008). Learning is carried out in interaction with others and not by sitting in a classroom and listening to lectures. The objective of learning is to learn metaskills, such as life-long learning, information retrieval, problem-solving skills and innovative and collective procedures for working life. (Helakorpi 2008). The aforementioned behaviour is easily transferred into working life, which lacks employees who are innovative and can make decisions. There has been a great need to change nursing education. The aforementioned requirements of working life and patient safety had created this need.

Simulation-based nursing education has changed simultaneously with the conception of learning. Simulation has been used and is used as a behaviouristic method, due to which information construction relies on mere disconnected pieces of information. Learning from examples has been adopted by nursing education from simulation-based medical education, in which it was used in learning separate procedures, such as surgical operations and emergency procedures (such as resuscitation). Simulation can be used for teaching processes, which brings also non-technical skills to learning. Simulation-based learning enables students to form an idea of real nursing in a social learning setting, and this information they can convey to actual working life.

However, nursing must keep developing. Our discipline cannot copy everything from pilot or medical training. Instead, it must find a method of using simulation that suits nursing. This is a challenge both for developers and learners.

References

Brandley, P. (2006) The history of simulation in medical education and possible future directions. *Medical Education*, 40, pp. 254–256.

Beier, K-P. *Virtual Reality: A Short Introduction*. University of Michigan, Virtual Reality Laboratory at the College of Engineering. Available at: www.iwayan.info/Lecture/GrafikKomputer2_S1/P13_IntroVirtualReality1.pdf. [10.2.2004]

Bloomfield, A. (1916) A demonstration Room. *AJN, American Journal of Nursing*, May, vol. 16, no. 8, pp. 705–707.

Benner, P. (1984) From Novice to Expert: *Excellence and power in clinical nursing practice*. Menlo park, CA: Addison-Wesley.

Clark, C. (1976) Simulation gaming. A new teaching strategy in nursing education. *Nurse Educator,* no. 1, pp. 4–9.

Corbett, N. and **Beveridge, P.** (1982) Simulation as a tool for learning. *Topics in Clinical Nursing*, 4(3), pp. 58–67.

Csikszentmihalyi, Mihaly. (2000) *Beyond Boredom and Anxiety. Experiencing Flow in Work and Play*. Library of Congress Cataloging-in-Publication data. A Wiley Company.

Cuthbert, S. and **Quallington, J.** (1999) *Developing Ethical Practice through problem Based Learning in Nurse education.* United Kingdom: University College Worcester.

De Tornyay, R. (1971) S*trategies for teaching nursing*. New York: John Wiley.

Davidhizar, R. (1977) Use of simulation games in teaching psychiatric nursing. *Journal of Nursing Education*, no. 16, pp. 16–19.

Eriksson, K., Isola, A., Kyngäs, H., et al. (2007) *Hoitotiede*. Helsinki: WSOY.

Euroopan yhteisöjen neuvoston suositus potilasturvallisuudesta ja hoitoon liittyvien infektioiden ehkäisemisestä ja valvonnasta. Brussels 15.12.2008. Available at: http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1973&format=HTML&aged=0&language=en&guiLanguage=en

Galloway, S. (2009) Simulation techniques to bridge the gap between novice and competent healthcare professional. *The Online Journal of Issues in Nursing*, 14(2).

Gibson, R. and **Singh, P. J.** (2003) *Wall of Silence.* Washington DC: Life Line Press. A Regnery Publishing Company.

Good, M. (2003) Patient simulation for training basic and advanced clinical skills. *Medical Education*, 37(1), pp. 14–21.

Helakorpi, S. (2008) Globaalit muutokset ja koulutusalueelliseen verkostokoulutukseen. In Helakorpi, S. (ed.) (2008) *Postmoderni ammattikasvatus – haasteena ubiikkiyhteiskunta.* Hämeenlinnan opettajakorkeakoulun julkaisuja 1/2008, pp. 47–57, Saarijärvi: Saarijärven Offset.

Herrmann, E. K. (1981) Mrs. Chase: A noble and enduring figure. *American Journal of Nursing,* 81(10), 1836.

Foley, M., Nespoli, G. and **Conde, E.** (1997) Using standardized patients and standardized physicians to improve patient-care quality: Results of a pilot study. *The Journal of Continuing Education in Nursing*, no. 28, pp. 198–204.

Jenkins, P. and **Turick-Gibson, T.** (1999) An exercise in critical thinking using role playing. *Nurse Educator*, 24(6), pp. 11–14.

Kneebone, R. L., Scott, W., Darzi, A. and **Horrocks, M.** (2004) Simulation and clinical practice: Strengthening the relationship. *Medical Education*, no. 38, pp. 1095–1102.

Kohn, T., Corrigan, M. and **Donaldson, S.** (2000) *To Err is Human. Building a Safer health System.* Committee on Quality of Health Care in America. INSTITUTE MEDICINE. NATIONAL ACADEMY PRESS. Washington DC.

L-3 Communications. (2010) *Link Simulation & Training* Setting the standard for 80 years. Available at: www.link.com/history.html [22.10.2010].

Laari, S. *Suomen ICT-sektori vuonna 2015.* Lappeenrannan teknillinen yliopisto, Teknistaloudellinen tiedekunta, Tuotantotalouden osasto , Tietojohtamisen opintosuunta. pp. 63–73. Available at: www.doria.fi/bitstream/handle/10024/42528/nbnfi-fe200810152013.pdf?sequence=1 [27.9.2011].

Laarni, J., Kalakoski, V. and **Saariluoma, P.** (2001) Ihmisen tiedonkäsittely. In Saariluoma, P., Kamppinen, M. and Hautamäki, A. (eds.) *Moderni Kognitiotiede*. pp. 85–119. Helsinki: Yliopistopaino.

Lehtinen, E. (1989) *Tietokone matematiikan opetuksessa: motivationaalisista vaikutuksista*. Joensuun yliopisto. Kasvatustieteiden tiedekunnan tutkimuksia 25.

Lees, F. (1874) *Handbook of hospital sisters*. London: W. Ibister & Co.

Mezirow, J. et al. (1996) *Uudistava oppiminen. Kriittinen reflektio aikuiskoulutuksessa* (Finnish translation by L. Lehto). Helsingin yliopiston Lahden tutkimus- ja koulutuskeskus. Helsinki: Painotalo Miktor.

Merril, G., Barker, V. and **Virginia, L.** (1996) Virtual reality Debuts in the teaching laboratory in Nursing. *Journal of Intravenous Nursing*, 19(4).

Nehring, W. and **Lashley, F.** (2009) Nursing Simulation: A Review of Past 40 Years. *Simulation & gaming*, 40(4), p. 528.

Patrikainen, R. (1999) *Opettajuuden laatu. Ihmiskäsitys, tiedonkäsitys ja oppimiskäsitys opettajan pedagogisessa ajattelussa ja toiminnassa.* Opetus 2000. Jyväskylä.
Philips, J. (1993) Virtual reality. A new vista for nurse researchers? *Nursing Science Quarterly*, 6(1), pp. 5–7.

Parker, B. C. and **Myrick, F.** (2009) A Critical examination of high-fidelity human patient simulation within the context of nursing pedagogy. *Nurse Education Today,* vol. 29, pp. 322–329.

Puolimatka, T. (2004) *Opetuksen teoria. Konstruktivismista realismiin.* pp. 15–24. Vammala: Vammalan kirjapaino.

Poikela, E. (2008) Koulutuksen ja työn uusi suhde – kohti työelämälähtöistä opetussuunitelmaa. In Helakorpi, S. (ed.) *Postmoderni ammattikasvatus – haasteena ubiikkiyhteiskunta*. Hämeenlinnan opettajakorkeakoulun julkaisuja 1/2008, pp. 66–67. Saarijärvi: Saarijärven Offset.

Rauste-von Wright, M–L and **von Wright, J.** (2002) *Oppiminen ja koulutus.* Helsinki.

Rosen, K. (2008) *The history of medical simulation*. Journal of Critical Care, vol. 23, pp. 158–159.

Salakari, H. (2007) *Learning Practical Skills in Virtual Environment. A Pedagogical Model for simulator-based harvester Operator Training.* Academic Dissertation. University of Tampere.

Schoenly, L. (1994) Teaching in the affective domain. *The Journal of Continuing Education in Nursing,* 2(1), pp. 16–24.

Siljander, P. (2005) *Systemaattinen johdatus kasvatustieteeseen*. Keuruu: Otavan Kirjapaino.

Sosiaali- ja terveysministeriö. (2009) *Promoting Patient Safety Together; Finnish Patient Safety Strategy 2009–2013.* Available at: www.stm.fi/c/document_library/get_file?folderId=39503&name=DLFE-7801.pdf.

Stillman, P., Ruggill, J., Rutala, P. and **Darrell, L.** (1980) *Journal of Medical Education.* March 1980, vol. 55, no. 3, pp. 186–193.

Titzer, J. L., Swenty, C. F. and **Hoehn, W. G.** (2011) An Interprofessional Simulation Promoting Collaboration and Problem Solving among Nursing and Allied health professional Students. *Clinical Simulation in Nursing*, vol. (9), pp. 2–3.

Tynjälä, P. (1999) *Oppiminen tiedon rakentamisena.* Tampere: Tammer-Paino.

Ulione, M. (1983) Simulation gaming in nursing education. *Journal of nursing Education*, 22, pp. 350–350.

Vartiainen, M., Teikari, V. and **Pulkkis, A.** (1989). *Psykologinen työnohjaus.* Hämeenlinna: Karisto Oy.

Voorhees, R. (2001) Compentency-Based Learning Models: A Necessary Future. *New Directions for Institutional Research*, vol. 110, Summer 2001, pp. 5–7.

Vygotsky, L. (1982) *Mind and Society*, (Finnish translation by Helkama, K. and Koski-Jännes, A.). Espoo: Weilin+Göös.

Yliniemi, P. (2009) Nursing and Healthcare Students' Experiences of Training in Simulation-based Learning Environment – ENVI. In T. Bastiaens et al. (eds.) *Proceedings of the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* 2009, (3275–3279), Chesapeake, VA: AACE.

Yoo, M. and **Yoo, I.** (2003) The effectiveness of standardized patients as a teaching method for nursing fundamentals. *Journal of Nursing Education*, 43, pp. 444–448.

Zeltser, M. and **Nash, D.** (2010) Approaching the Evidence Basis for Aviation-Derived Teamwork Training in Medicine. *British Journal of Anaesthesia*, July, vol. 105, no. 1, pp. 3–6. http://ajm.sagepub.com/content/25/1/13.short.

Sociodrama and Psychodrama and Their Relation to Simulation in Health Care

➥ PETER DIECKMANN & PAULA YLINIEMI

Introduction

Simulation in Health Care is spreading rapidly around the world, across disciplines and simulation modalities, such as manikin-based simulation, simulated patients and virtual reality systems. Nevertheless, the theoretical foundations of its use for education, training, research and assessments are not well elaborated upon. Theories address learning theoretical foundations, research approaches, the question of how closely a simulation can replicate the system or part of the world that it is representing, and how a simulation can be addressed as social practice (Dieckmann, et al., 2011).

The relation between a simulation and the simulated system has been described as relying on a variety of concepts, *such as simulation fidelity (Hays & Singer, 1989; Scerbo & Dawson, 2007), simulation realism* (Dieckmann, Gaba, & Rall, 2007), *simulation verification* (Feinstein & Cannon, 2002) and also the concept of *presence* (Ijsselsteijn, de Ridder, Freeman, & Avons, 2000). There are some common aspects in the different approaches: 1) The relationship is seen as being multidimensional: more than just the physical features of the simulator influence the perception of similarity between the simulation and the simulated system, for examples, how the simulator is used and how the different parts of the simulation scenarios (e.g. role players or the physical location in which the simulation takes place) interplay with each other. 2) The similarity between the simulation and the simulated system is not an end in itself, but a means to achieve an end, like creating learning opportunities or precise research conditions. 3) "More" is not actually "better" in all cases. To reach some ends, it is an advantage to actually reduce the realism, for example, to optimize the complexity of the learning situation. Many learners would be overwhelmed by a completely realistic simulation and benefit from "unrealistic" simplifications.

Another set of theories focussed more on the understanding of a simulation's integration into various contexts, conceptualizing simulation as a social practice (Dieckmann, 2009; Dieckmann, Gaba, et al., 2007; Johnson, 2004; Rystedt & Lindwall, 2004). These frameworks try to understand and describe the rules of functional simulation settings: What needs to happen and how do the people who are involved need to act in order to create meaningful social interactions in simulation settings. For example, actual or constructed clinical cases are transformed into simulation scenarios. During this process, certain changes and adaptations are necessary to adapt to the features of the simulator that is used and the available resources and the aims and objectives of the simulation session. The people who are involved change their actions according to the rules that are defined in the setting, and they interact with each other based on those set rules. For example, some of the participants deliberately engage in role-playing to make the scenario work. Goffman has conceptualized patient simulation as a modification of clinical cases, distinguishing them from deceptions (Goffman, 1974). A modulation is based on mutually known and

accepted rules, while, in a deception, not all of those who are involved are aware of the changes that have occurred. Some participants expect to be deceived in a simulation, considering the simulation to be full of traps and conceptualize their task to "win against the simulation team", by not falling into those traps (Dieckmann, Manser, Wehner, & Rall, 2007). For simulation settings, it is, thus, important to understand the rules according to which they function and to actively influence and work with them in order to reach the aims and objectives of the setting.

Jacob Levy Moreno (1889 – 1974) developed the conceptual framework of Psycho- and Sociodrama (Moreno, 1987). Moreno viewed each person as a composite of the roles that he or she plays. These roles are a culturally recognized and agreed upon cluster of behaviours. He also noticed that each role has both collective (shared) and private (individual) components. Some roles would only be taken on in protected and private settings (e.g. the "doubtful thinker"), while others might also be used in public (e.g. the "decisive decision maker"). Sociodrama, then, concerns itself with the collective role aspects, whilst, psychodrama, focuses on private role aspects and on the individual's personal problems (Stenberg & Garcia, 1989, 5-7.)

Psycho- and Sociodrama allow for combining the conceptualization of the relation between a simulation and the simulated system, while integrating the social meaning of the endeavour. As a physician, Moreno was interested in healing and, thus, emphasised the ends which should be achieved via the methods and tools that he used. We will explore how his concepts and thinking could stimulate the theories and practice of current simulation in health care, with a special focus on the learning-related use of simulation.

What is Psychodrama and Sociodrama?

Psychodrama and sociodrama are like the opposite sides of the same coin. They are both grounded in Moreno´s theory of spontaneity and creativity and the role theory of personality. (Stenberg & Garcia, 1989, 5-7; Blatner, 1997, 19).

Psychodrama is a generic term when we are talking about drama methods, which are often called "action methods". Psychodrama is carefully defined as group psychotherapy, where the starting point is the individuals' life situation. Psychodrama can be used in a group or individually for therapy and personal growth. It can also be applied to family and couples therapy (Kellerman, 1992, 31-32) and in a wide variety of other contexts, such as training, coaching, supervision (von Ameln, Gerstmann, & Kramer, 2004). Psychodrama works with five elements. The "stage" is a physical space in the group room, in which the action takes place. The "protagonist" provides the problem or story line of the action. The "group" observes the action and, in part, actively engages in it. "Auxiliary Egos" represent certain roles of the protagonist, or aspects of those roles, such as thoughts, feelings, other persons, etc. – they are represented by members of the group or artefacts. A "psychodrama director" guides the process, making sure to reach the goals of the session, whilst keeping the well being of the protagonist and the group in mind.

Sociodrama is a group action method in which participants spontaneously act out agreed-upon social situations. It can provide an action forum for resolving conflicts among people with different views, clarifying values, developing social skills, solving problems, improving personal effectiveness and awareness. The elements of sociodrama are distinct from those of psychodrama, in that the protagonist and the group are not differentiated. The action takes place at a group, not at an individual level.

Socio- and psycho dramatic "role playing" (which has a different meaning than playing a role in a theatre) may be regarded as an attempt to simulate or represent reality and gives the student an opportunity to grow. Students can expand various parts of their self through actively trying out new roles in a similar way as one tries on a new coat. So, the new roles may help develop a more flexible and functional identity. All of the participants know that the "as-if" activity is not "real". But this make-believe aspect disappears as soon as the participants become emotionally involved in the role-playing and begin to think, feel and act the way that they do in real life. The amount of emotional involvement (the level of the warming up is important here) in role playing is

the factor which determines the authenticity of "as-if". (Kellerman, 2000, 117-119)

Psychodrama and sociodrama have many similarities. Both are concerned with human development. They want people to work to grow and change, to have a greater understanding of themselves and the world. They both help people to build proficiencies, to become more skilful in specific areas, so that they feel more competent. And they both provide opportunities for people to interact and express thoughts and feelings (Stenberg & Garcia, 1989, 6.) "It taps into the truth about humanity that we are more alike than we are different" (Stenberg & Garcia, 1989, 6). Both socio- and psychodrama use "action methods", which is a term used to describe visual and role-based approaches to individual and group work. Both psycho- and sociodrama get people out of their chairs and have them explore topics of interest to them in action (Stenberg & Garcia, 1989, 3-4; Lindqvist, 2005, 15-16).

When best utilising sociodrama, it is possible to achieve creative collaborative problem-solving (Lindqvist, 2005, 19).

Further, both psycho- and sociodrama deal with thoughts and feelings. However, sociodrama focuses, at all times, on the way that participants tap into the collective issues and not the private problems like psychodrama would. Thus, sociodrama is less self-relevatory than psychodrama. Also, sociodrama creates prototypical "for instance" situations, whilst psychodrama recreates situations from the individual's personal life, dreams and fantasies. At the end, sociodrama focuses on educational modality, while psychodrama focuses on therapeutic modality (Stenberg & Garcia, 1989, 5-7.).

Consider, for example, teamwork in health care. In Sociodrama, the team might, under the guidance of the sociodrama director, re-enact certain situations in which the similar dynamics of their everyday work would show up. Together, the team reflects on their actions during the action part and consider what they like and want to keep and what they would like to change. In Psychodrama, the psychodrama director would help a single person, working in a team to better deal with the challenges that she or he may experience during their work.

The Phase Concept of Psychodrama and Sociodrama

Every psycho- and sociodrama session has three components: 1) *the warming- up*, where people are preparing for the action; 2) *the enactment/the action*, when the group participates in dramatic action and 3) *the sharing/integration*, when people let each other know how they have identified with the action and what they have learned. (Stenberg & Garcia, 1989, 15-24; Blatner; 1997, 24-26; Kellermann, 2000, 168-172.)

The warming-up is crucial for the whole drama. One might say that the core of the whole session is in it and prepared by it. Using warming-up, the whole group moves into a current of experience, builds trust, energy and the ability to dive into the action (Lindqvist, 2004, 13). The director's task is to lead the members of the group during the warm up: get comfortable with each other, having the necessary time to interact, discuss issues that are on their minds and choose the topic and question that they want to explore. When this goes well, people will have "action hunger", which will easily engage them into the action. (Lindqvist, 2005, 20, Stenberg & Garcia, 1989, 16; Blatner; 1997, 24.)

The warming up will always take place at a physical, cognitive and affective level. In summary, you can say that it will if the warming up has worked well: release spontaneity, raise energy, keep the attention on the common focus of a common and emerging theme (if it is not provided externally from outside the group), create the same reality, create the alliance, build confidence, stimulate interaction and enable the group to work in the "here and now".

The second part of the session is the *enactment or action phase*. In psychodrama, the director guides the action of the protagonist, who re-creates a scene from his or her life, using the other group members on stage. In sociodrama, the action phase is the time and place where the group members spontaneously act out a scene which they selected during the warm-up. Sociodrama provides a safe place for the trying out of new behaviours. In their actions, the group members open themselves up to more possibilities of action and experience. It is possible to interact with others and handle situations spontaneously and honestly (Stenberg & Garcia, 1989, 18), examine the problem (Blatner,

1997, 76), get information about internal and external roles (Lindqvist, 2005, 23), gain more self understanding (Kellermann, 2000, 85) and question the old information (Tervamäki, 2005, 109).

The third part of the sociodrama session is *the sharing/integration*. It is very important and it should never be ignored. Since the examining approach and intellectual interest is so large, after the action of psycho- and sociodrama, there must be a lot of time for the processing and integration of what was learned through the action. There is usually a great deal to be integrated to what was learned previously. The sharing takes place on the level of feelings, experience and story (Lindqvist, 2005, 23). The process is paramount in sociodrama. "One of the greatest values of sharing is that through the process, individuals become less isolated. They come to see that others have similar experiences, respond similarly, and feel as they do." (Stenberg & Garcia, 1989, 20). The sharing is also a time for the generation of alternate solutions to the problems explored in the enactment and use them in the future. (Stenberg & Garcia, 1989, 20) The main purpose of sharing in psychodrama is the re-integration of the protagonist into the group and his or her experience into the previously existing role repertoire. In sociodrama, the main purpose is to improve the skills of a group member, when it is used in training and team development (Kellerman, 2000, 161).

Connections Between Sociodrama, Psychodrama and Simulation

With the "simulation setting" concept, the psychodramatic phase concept was transferred to patient simulation (Dieckmann, 2009). Different phases in simulation settings were described, which can also be related to the phases of a psychodrama, which we will perform after introducing them:

- Pre-briefing: Information that participants receive before actually coming to the course
- Setting introduction: The beginning, in which participants get to know each other and what the setting is about
- Simulator briefing: A principle explanation of the simulator, its environment and how both can be used
- Theory input: An explanation of the key concepts (not given in all settings)
- Breaks: The phases of networking, relaxation
- Scenario Briefing: An explanation of and instructions for the next concrete scenario and the principle roles and task therein
- Debriefing: A guided reflection of the actions and performance during the scenario
- Course Ending: The end of the course, in which participants reflect upon the learning points and the group departs

The different phases influence each other mutually. The instructions at the beginning of a course and how the scene is set will influence how openly the participants will engage in the simulation and later in the debriefing.

Warming Up Processes

Any simulation setting, whether a course, research setting, or assessment setting needs preparation and, thus, warming up. When the warming up is performed insufficiently or in a direction that does not match the aims and objectives, participants might not understand or agree to the rules of the simulation setting. For example, the simulation team might try to warm the group up for topics of interprofessional communication, but the group warms up more for the technical medical questions and issues of providing the correct drugs in the right dosages. The warming up can be seen on both a macro level and a micro level: on the macro level, participants experience warming up at the beginning of the course (e.g. pre-briefing, setting introduction, simulator familiarization, scenario briefing), action during the course (e.g. scenarios and discussions) and integration towards the end of the course (e.g. debriefing, course ending and also breaks). On the micro-level, warming up, action and integration also occurs within single elements of the setting (e.g. the beginning of the debriefing will influence how it will unfold).

The warming up begins, in principle, with the "pre-briefing" before the course. The expectations created by information about the course, its content and procedures will influence how participants enter the setting. The discussions and actions at the beginning of the course will set the tone for

what is to come and, thus, warm up participants for certain aspects but not for others. For example, the simulation team may set the focus on certain contents of discussions and interact themselves in a certain style. Participants will hear the verbal messages and see and experience the non-verbal messages. The group's willingness to engage will be influenced by the warming up. During the simulator briefing, participants might warm up for the use of the simulator. In courses especially for participants with little simulation experience, this warming up is often physically visible, when participants slowly approach the simulator step by step during this phase, physically starting from as far away as possible. A key phase for the warming up is the scenario briefing, which helps participants to transform a piece of technology into a character and representation of a patient. Depending on how the scenario briefing is done, participants really get into the mood of treating the simulator as a patient. When the simulation team does not have a clear picture of the patient who is treated during the scenario, when the team has, thus, not warmed up for their own scenario, it will be difficult for them to assist participants into the scenario. Also, taking on special cloths, getting instructions about the roles to play, gaining explanations concerning the mechanics and procedures of the simulation all help to warm up for the experience.

At the beginning of the debriefing, warming up occurs as a primary integration phase. The instructor might explain the focus of the debriefing in relation to the learning goals and explain the basic procedures. This helps get participants onto the same page and work with the instructor towards the learning goals.

Where the warming up is short or missing, participants may find it difficult to engage in the simulation experience. They might not "transform" the technological artefact into a patient to be treated, nor the staged situation into a relevant learning situation. The warming up might also have taken place in the wrong direction. When participants have warmed up for a certain set of topics, they may find it difficult to switch focus and discuss a different topic instead.

Also, the end of the course, typically seen as an integration phase for the course, can be seen from the warming up perspective. Participants integrate their experiences during the course and, at the same time, warm up for the application of what they learned during the course. The simulation team can support this by discussing application possibilities.

Some of the warming up in the setting may be consciously supported by the simulation team, for example, via instructions, negotiations, or by examples. Other warming up activities might occur from different sources, for example, internal processes by participants. They might be reminded by the simulation scenario about an actual clinical experience. This may, at times, trigger strong emotional responses. Warming up may also be triggered by the interactions with other people in the setting, for example, via discussions with fellow course participants.

For the simulation team, it seems important to consciously design the warming up process as much as possible, but also to be open for those warming up processes that might occur without much of their influence. It is about recognizing the direction and topic of the warming up and then using the resultant energy to reach the aims and objectives of the simulation setting.

Action Phases

The action phases seem to be the most prominent features of a simulation – simply for the action oriented scenarios. It is pleasant and interesting to observe the simulation unfolding – lots of action, concrete experiences and a great deal of visceral activation is involved. The socio- and psychodramatic angle points towards analysing the action phases with an open mind to what is actually going on during the action phases – using the "here and now" of the simulation.

There is a, often subtle, difference between the planned and "official" actions that are related to the scenario briefing and the obvious role distribution and the more direct, often unconscious, level of actions. The difference can, at times, be noted via a mismatch between the verbal and non-verbal messages, emphasizing, for example, how important each team member is, but then performing team briefings without taking into account that one member cannot listen because of another task. Here, a weakness of simulation can actually be taken advantage of. In many details,

a simulation can never replace the real setting: it may be unknown colleagues who the participants are working with, they may not know the room, etc. In many cases, participants mention this and sometimes even complain about this fact. By taking the action in the "here and now" serious, looking at what is happening in this moment, in this space, interesting learning can occur. How do the participants work and interact with unknown people? How do they organise the work? How do they orient themselves within the room? And what can they take out of this analysis for their work in the work setting?

By taking what happens in the simulation seriously, interesting insights can be made concerning the actions of the participants – a different level of feedback can be achieved. This level of analysis requires a special warming up in order to avoid resistance. This level of action analysis would strip away many "emergency escapes" (it is just a simulation). Real action occurs in socio- and psychodramatic spaces, similar to the real action in simulation scenarios and real learning can come from those. On the sociodramatic level, a group can analyse the processes and patterns of interaction in the situation and then analyse similarities and differences to the clinical setting later. On the psychodramatic level, one or more persons can analyse the impact of those patterns onto themselves, as well as their own influences on those patterns.

This level of action analysis can be used during the scenario and also during the debriefing. How does the team act during the debriefing? How do leaders and followers interact with each other? What can be learned and reflected upon from those interactions? Here, the action and integration phases can mutually inform each other.

Integration Elements

Integration elements mostly occur during debriefings and the course ending. Participants derive learning from the previous actions and reflections, while potentially anticipating their application during actual clinical cases – again, integration and warm up can be closely connected.

Much has been written about the content side of debriefing and integration. The attempt to identify the frames behind actions, helping people to analyse those frames and trying to match and revise frames and, consequently, their actions to their work could be considered to be state of the art (Rudolph, Simon, Dufresne, & Raemer, 2006).

Socio- and psychodrama allow the perspective to be broadened in a substantial way. For many aspects, the best analysis of frames and the sharpest analysis of the following actions will not yield systematic change – at least not quickly, all the time, or systematically. Our human patterns of perception and cognition function in a way that makes them prone to certain "errors" – one might also say, they function according to certain characteristics. The addressing of those issues will focus attention on short comings. Such attention can be helpful in some regards to counteract challenges. In many instances, however, knowing the problem will not necessarily help improvements, simply because the "error" might be a feature of otherwise functional perception and thoughts patterns. This would be the case, for example, whenever wrong actions follow the erroneous perception of a situation, where the perceiving and acting person only becomes aware of the error after the fact.

Imagine, for example, a student who engages in resuscitation and refuses the help of a bystander who is trained in first aid. It will be easy in most cases to convince the student that it would have been better to have accepted the help. The question about the reason for the refusal might well produce the answer "I don't know", or, if the setting is safe and the person is very reflective, it might be: "I was so occupied with organising myself that I simply could not think about how to integrate their help". Every sentence that emphasizes the need to include the bystander might increasingly induce the feeling of being "stupid" in the learner. Here, the sharing aspect might be helpful. The instructor could share similar experiences in similar situations – whether they are professional or private. Also, the other participants will likely have experiences along those lines that they could share. By doing so, the learner might receive the emotional support to be open for the reflection about possible countermeasures. If I am not the only one, who has a limited mental capacity, it is easier to reflect upon ways of controlling it better.

A key in the sharing and integration phase would then also be to acknowledge the ”reality” of the situation. Humans cannot, in most cases, overcome their limitations in an ”error eliminating” way. We can capture many errors, we can reduce many – but we will always do things that we think are right in a situation and, of which, we often say that they were wrong, stupid even, after the fact. The sharing of this amongst different humans can be very helpful.

Techniques of Sociodrama and Psychodrama and Their Relation to Patient Simulation

The enactment is the heart of the whole sociodrama session. The techniques which are often used during the psycho- and sociodrama are:

Sociodrama and psychodrama offer a canon of methods which can be used throughout all phases.

- *Role reversal, where two people physically and psychologically change roles: for example, when it is difficult in assessing the affects of one's own behaviour on others:* The acting person actually switches their role with a representative of another person, part of a person, argument, or whatever is being represented. Similar techniques are discussed in the training literature under ”cross training” (Kellerman, 2000, 148-149). Such a reversal can enhance ones own view of a task, interaction or another part of treatment. It literally provides the possibility to view the world through different eyes. It is important during the integration to link the alienated experience back to one's real experience. The nurse who switches into the role of a physician should integrate that experience in her professional nursing self. The debriefer would need to support that process, for example, by asking to reflect on learning points from that alienated experience for her real profession.
- *Aside soliloquy, when one person talks as-if no one was listening or as-if he/she is thinking aloud about her or his perceptions: for example, when more information is needed to find an appropriate point:* by sharing thoughts and feelings, his or her frame of the situation, by “thinking aloud” during scenarios, the other team member can be engaged more fully in the treatment of the patient. During debriefings, such thinking aloud can help understand the motives for actions.
- *Double, where one person offers his or her perceptions of the situation, while seeing the scene from the perspective of another person: for example, the protagonist is unable to enact roles that are desired and would be effective in the scene (Blatner, 1997, 23, 7-104, Kellerman, 2000, 147-151):* The facilitator or other group members offer their perception of the situation to the learner in the form of a question. If the learner is Lisa, her colleagues Ruth and Claus might offer their perception to Lisa. Ruth: ”I as Lisa was confused in this situation, because I had to think about so many aspects in parallel”. Claus: ”I as Lisa felt really well, because I could keep so many things in my mind at the same time”. For every sentence, the instructor would then check back with Lisa, whether they sound true, partly true, or false. It is important that the other persons here do not tell Lisa what to perceive, but they offer what they themselves see in the situation and, basically, put their thoughts into Lisa's mouth, who can then see, what they feel and hear. New aspects may be discovered in a way that a learner might not have dared or been able to explore. It is certainly of vital importance to protect the learner from over-interpretation and group pressures, where the group might force the learner to see a certain point. Nevertheless, this technique can be helpful in exploring and refining mental models and frames.
- *Mirror, where one person steps out of the scene on stage and looks at it from another angle: for example, the protagonist is overwhelmed with emotions in the scene or is unable to discover helpful resources from within the scene, but could develop new insides from an external perspective:* This technique is partly used in many centres, wherever video recordings of the case are available. A major difference is, however, that the learner sees themself in the recording, not someone enacting

them, which would provide more space for interpretation and psychological emergency escapes. Again, by changing the perspective, a great deal can be learned and the situation can be seen with new eyes.

Surplus Reality and Simulation

With the overall notion of a simulation ”replicating” a real-world system or a part of the ”real world”, there is a potential limitation in the possibilities that a simulation offers. As a technical challenge, it is an interesting task to try to minimize the differences between the simulation and the system that it simulates. This can be found in many different simulators and is seen as a key advertising feature. One might also observe a similar strive in different areas, such as animation movies, where many of the characters are designed to look as ”realistic” as possible. Skin, fur, eyes are drawn and animated in better and more detailed ways. The audience is moved, if animations look so realistic.

Moreno's concept of ”surplus reality” points to the possibilities that go beyond the mere attempt to replicate the ”real system”. The stage in socio and psychodrama offers possibilities that are simply not present in the real world. Emotions, thoughts and other invisible entities can be represented by persons or physical objects. By assigning qualities to these and by interpreting them as signs and symbols, by using their location in the room and the energy with which they are charged by those processes, these people and objects can very well represent entities far beyond themselves. A surplus value is created. The concept has similarities to Eco's ”hyperreality” concept (Eco, 1998), with which he describes qualities that pictures, texts or artworks might unfold when viewers interact with them. A classic example may be the sunset postcard. With lots of time and many attempts for the right day to capture the picture, with picture processing and being sold in the romantic setting of the holidays, the little piece of printed cardboard might develop qualities that the actual sunset might not achieve – or, at least, not very often. During simulation in health care, many processes can be changed in a way that would allow the learning experience for the participants to be intensified, going beyond the possibilities of the clinical setting (Dieckmann, 2009).

The surplus reality on the psycho- and sociodramatic stage is actively created by those who are involved. For example, the group, for whom the sociodrama is run to investigate their communication patterns, might physically represent elements of the patterns. Ropes might represent typical communication paths and other objects, such as pictures or postcards, might further qualify those connections. A picture of a snake might be selected by the group to represent hidden messages in the communication patterns, a picture of tank elements of open dispute, clouds for uncertainties, and puppies for a generally accepted cosy feeling during those interactions. What is usually implicit in the interactions now is made explicit by physical objects. Those objects on the other hand have a level of abstraction and some kind of translation process is involved. Not all of the members in the team may interpret the lion in the same way, the different pictures and associations in mind might be different from person to person – leaving room for interpretation and personal relevance. The polysemy of the pictures permits going beyond their direct physical characteristics. The reality that they gain in the minds of those involved reaches beyond the reality of the objects on the stage. Those principles could be used during debriefing sessions, where the team analyses the processes and actions during a scenario in more detail, representing the key issues physically.

The stage also allows for further and different tools to represent the aspects of reality to intensify their meaning, impact or influence: objects could be placed in high physical locations (e.g. a ladder), might be represented in multiple instances, they could be represented larger than they actually are etc. During simulation scenarios, certain aspects and actions might be overemphasised.

Is Simulation Related to Socio- or Psychodrama?

As so often: it depends. In most cases, given the nature of the use of simulation for vocational development, one would argue that the main relevant framework would be the sociodramatic

one. The group is interacting and serving as the prime focus, not the individual. The advantage of this reflection is, however, that it becomes clearer to draw a line between elements that should be the focus of the discussion. At times, during debriefing, it is difficult to distinguish, whether a discussion of a certain aspect serves the group, or the individual. The concepts unfolded above, the question, whether it is the public or the private roles that are investigated can serve to clarify the debriefing interactions and assist in facilitating the discussion in the best interest to achieve the aims and objectives of the setting.

There are, however, also possible elements of psychodramatic work. If, for example, a team would have access to a simulator, they could take turns in staging those elements that are of concern to individual members of the group in turns.

Summary

Socio- and psychodrama and simulation have much in common. They all have the same primary purpose to improve the professional skills of students in training. Also, the active nature of learning is common for all of them: learners become active and then reflect on and integrate those actions. The learning takes place at the physical, cognitive and affective level. All socio- and psychodramas and simulations happen in an "as-if" world, with the advantages and challenges that are sketched above. The setting allows the analysis and enlarging the role repertoire – both public and private. Students have personal learning experiences which they also need to implement in real life. This means discussions, reflection and the conceptualisation to strengthen the connection between theory and real life to expand role repertoires and skills. All training session must be shared in the levels of feelings, experience and story, so that the group shows what they have learned about themselves and what is still unfinished. People can have an increased understanding of behaviour, beliefs and attitudes. All of this means that students have a possibility to increase awareness and learn new roles, expand reality, learn new skills and the importance of the awareness of the consequences of our own behaviour.

We have introduced psycho- and sociodrama with their basic assumptions, elements (stage, protagonist, group, auxiliary egos, director) and phases (warming up, action, sharing). We applied the basic concepts to simulation in health care and discussed the implications for simulation practice.

References

von Ameln, F., Gerstmann, R., & Kramer, J. (2004) *Psychodrama*, Berlin: Springer.

Blatner, A. (1997) *Acting-In. Practical Applications of Psychodramatic Methods*, Toiminnalliset menetelmät terapiassa ja koulutuksessa. Psykodraaman ja sosiodraaman tekniikat käytäntöön sovellettuna. (suom.) Springer Publishing Company inc. New York.

Dieckmann, P. (2009) 'Simulation settings for learning in acute medical care', in P. Dieckmann (ed.) *Using Simulations for Education, Training and Research*, pp. 40–138, Lengerich: Pabst.

Dieckmann, P., Gaba, D., & Rall, M. (2007) 'Deepening the Theoretical Foundations of Patient Simulation as Social Practice', *Simulation in Health Care*, 2(3), pp. 183–193.

Dieckmann, P., Manser, T., Wehner, T., & Rall, M. (2007) 'Reality and Fiction Cues in Medical Patient Simulation. An Interview study with Anesthesiologists', *Journal of Cognitive Engineering and Decision Making*, 1(2), pp. 148–168.

Dieckmann, P., Phero, J. C., Issenberg, S. B., Kardong–Edgren, S., Ostergaard, D. & Ringsted, C. (2011) 'The first Research Consensus Summit of the Society for Simulation in Healthcare: conduction and a synthesis of the results', *Simul Healthc*, 6 Suppl, S1-9.

Eco, U. (1998) *Faith in Fakes. Travel in Hyperreality.* London: Vintage.

Feinstein, A. H., & Cannon, H. M. (2002) 'Constructs of simulation evaluation', *Simulation and Gaming*, 33(4), pp. 425–440.

Goffman, E. (1974) Frame Analysis. An Essay on the Organization of Experience. Boston: Norheastern University Press.

Hays, R. T., & Singer, M. J. (1989) *Simulation Fidelity in Training System Design: Bridging the Gap Between Reality and Training.* New York: Springer.

Ijsselsteijn, W. A., de Ridder, H., Freeman, J., & Avons, S. E. (2000) 'Presence: Concept, determinants and

measurement', *Proceedings of the SPIE, Human Vision and Electronic Imaging,* V, 3959–3976.

Johnson, E. (2004) Situating Simulators: *The integration of simulations in medical practice.* Lund: Arkiv

Kellerman, F. (2000) *Focus on Psychodrama. The Therapeutic Aspects of Psychodrama*. Athenaeum Press, Gateshead, Tyne and Wear. Great Britain.

Lindqvist, M. (2005) 'How do I use action methods?' in Lindqvist, M., Kopakkala, A., Nieminen, S., Sura, S., Tuomisto, M., Santasalo, H., Eklund, K., Janhunen, T., Tervamäki, P., Tarkiainen, L., Salomaki, J., & Partanen-Hertell, M. *Miten käytän toiminnallisia menetelmiä? Psykodraaman ohjaajat kertovat*, RT-Print Oy. Pieksämäki.

Moreno, J. L. (ed.) (1987) *The Essential Moreno. Writings on Psychodrama, Group Methods and Spontaneity.* New York: Springer.

Rudolph, J. W., Simon, R., Dufresne, R. L. & Raemer, D. (2006) 'There is No Such Thing as "Nonjudgmental" Debriefing: A Theory and Method for Debriefing with Good Judgment', *Simulation in Health Care*, 1(1), pp. 49–55.

Rystedt, H., & Lindwall, O. (2004) 'The Interactive Construction of Learning Foci in Simulation-Based Learning Environments: A Case Study of an Anaesthesia Course', *PsychNology Journal,* 2(2), pp. 168–188.

Scerbo, M., & Dawson, S. (2007) 'High Fidelity, High Performance?', S*imulation in Health Care,* 2, pp. 224–230.

Sternberg & Garcia. (1989) Sociodrama. *Who's in Your Shoes?* Praeger. New York.

II DEVELOPING SIMULATION PEDAGOGY

Key Results of a Benchmarking Study on Simulation Education

➥ OUTI TIERANTA & PAULA POIKELA

The objective of the TOVI project was to benchmark health care simulation in educational institutions and simulation centres in nine European countries, establish a network and disseminate good practices. The benchmarking study included interviews and visits to the educational institutions. Interviews were conducted from June 2010 to February 2011. The benchmarking study was qualitative and the research material was collected through theme interviews. The themes consist of simulation-based teaching in selected areas. The whole body of the interview data was analysed by using inductive content analysis.

Introduction

Simulation can be defined as action that attempts to imitate reality. Simulation can be implemented through role-playing, the interactive video and *human patient simulators* (HPS), which can help students learn decision-making, critical thinking and various other skills. Simulation education gives both experienced and novice learners the chance to practise for rare situations or for situations that are too risky to be practised with real patients. Simulation education offers a new perspective for considering the ethical aspects of nursing. It provides the opportunity for practising technical nursing skills before they are used in the treatment of real people. Erroneous procedures can also be observed through simulations without harming the patient. (Jeffries & Rogers 2007; Amitai, Wolpe, Small & Glick 2003).

In the nursing degree programme of the Rovaniemi University of Applied Sciences, simulation education has been implemented since 2005 and simulation education development is one of the most important focus areas. Process benchmarking was selected in the TOVI project as the method for identifying and developing the best and the most effective simulation education processes. The development process was implemented in the degree programme of nursing, which received the quality award of the Finnish Higher Education Evaluation Council in 2008 and 2009.

Benchmarking as a Development Tool in the TOVI Network

Benchmarking is a development process which was initially created for land surveying and business and which is now used by educational organisations in addition to many other sectors. Benchmarking is a tool for improving and constantly developing the performance of an organisation. The development process includes the analysis of the performance of the organisation, the definition of development areas and the comparison of functions to organisations which have indicated a high competence level regarding the aspects of the defined development areas. (Kulmala 1999: 20–23.)

A benchmarking process has to be a long-spanning activity, and it requires commitment. Benchmarking is a continuous management process that requires constant updating. The process includes five main stages: *planning, analysis, integration, action* and *maturity*

(Camp 1989: 17). Bogan (1998) distinguishes three benchmarking types: performance benchmarking, process benchmarking and strategic benchmarking (Härkönen, Juntunen & Pyykkönen 2002: 16).

Process benchmarking begins with an analysis of the best process or practice of the organisation and comparing it to the best processes with similar content in other organisations (Kulmala 1999). When process benchmarking is conducted with a reference organisation within the same sector, the development areas can be defined rather quickly. Camp (1989) emphasises that if benchmarking is concerned only with work processes, the improvement can be small. Processes should be observed as part of the whole operational entity. In addition to the process analysis, process benchmarking can include definition of environmental factors and circumstances (Kulmala 1999).

The stages of the benchmarking process are similar to the model used by Kaartinen-Koutaniemi in a project for developing the practical training of higher education institution students. In the first stage, the development process is selected and the current state of the organisation is described. In the second stage, a network is established and the comparison partners are selected. In the third stage, visits are agreed on and the comparison is carried out. After these stages, an analysis is performed, new objectives are set and the results are interpreted. The benchmarking process of the TOVI project is presented below.

1) Selecting the development process and describing the current state of the organisation

The objective of the benchmarking study was to examine the implementation and good practices of simulation-based learning in nursing which promotes patient and customer safety in European nursing education organisations and simulation centres. The description of the current state of the organisation included a pedagogic plan of the simulation education in the degree programme in nursing. The plan describes the pedagogic solutions and contents in the integration of simulation education into the nursing curriculum. The plan was sent to the partners.

2) Establishing the network and selecting the partners

Establishing the TOVI network was begun by mapping the European simulation centres and higher education institutions which are co-operating with RAMK and which were known to use simulation and have the will to develop simulation education. The interest of candidate organisations to participate in the network was inquired via e-mail, and, by the final response date, nine higher education institutions and two simulation centres stated that they are interested in joining the network. The background information of the comparison partners was gathered using a questionnaire in advance. The comparison partners also had the chance to send a free-form description of their operations. The background information was checked and added during the visits.

3) The visits and comparison

The benchmarking visits were paid between June 2010 and January 2011. The visits included interviews and visiting the simulation facilities of the organisations. In order to enable comparison, the answers for the following questions were sought:
- How is simulation implemented in the TOVI network organisations?
- What kind of good practices the organisations use in nursing simulations?

4) The analysis and setting new objectives

The TOVI project network consists of nine higher education institutions which provide simulation education and two simulation centres in a total of nine European countries. In order to set new objectives, the analysis focused on the following aspects in accordance with the interview questions:
- The implementation of simulations
- The recognition of good practices in nursing

5) The interpretation of the results

Simulation education is given both to students who are studying for an initial qualification and health care professionals. Attention was paid particularly to the simulation contents and the simulation procedures.

Simulation in Health Care Education

Simulation as a concept in health care education is by no means new, but its scope of applications has expanded. Patient safety and the development and decreased costs of technology have resulted in that simulation education is being used in both medical and nursing basic education and in further studies for health care professionals. Individuals' definitions of simulation can differ greatly, especially in the context of health care education. Alinier (2007) categorises the use of simulation onto six levels on the basis of literature and describes them. This typology should form the basis for discussing simulation in health care.

Alinier's (2007) simulation education typology was selected as the basis of the benchmarking analysis to avoid ambiguity concerning simulation education. The benchmarking results are compared to Alinier's levels 0–5.

Analysis and Results of the Benchmarking Material

The information was gathered through theme interviews. The theme interview is a semi-structured interview method that offers the advantage of changing the perspective. The order of interview topics can be changed easily when needed, and the interviewees' attitudes towards the interview can be controlled easily. (Hirsjärvi, Remes & Sajavaara 2008: 200–201). The themes of the interview are resources, contents, pedagogy and development. The respondents had the opportunity to see the semi-structured questionnaire in advance.

The questionnaire was tested and the questions were edited in the Tampere University of Applied Sciences by a group of experts. The questions were translated into English. The interviews were implemented between June 2010 and January 2011. Two of the interviews were carried out via Skype due to the lack of time. The benchmarking interviews were recorded and notes were taken during the interviews. At least two interviewers participated in each interview. At most, four interviewers participated in an interview. The interview-specific number of interviewees, who are all experts whose work is related to simulation, ranged from two to fourteen.

The interviews were transcribed onto 110 pages. The material was analysed by content analysis. Content analysis is a method in which the studied phenomenon is described systematically, comprehensively and concisely through various categorisations. The analysis can be inductive and based on the material or deductive and utilise an earlier theory or conceptual system. The research material was analysed using inductive content analysis.

In the first stage of content analysis, the unit of analysis is determined. It can be a word, compound, clause, statement or conceptual entity. In this study, clauses and conceptual entities are the units of analysis. In the second stage of analysis, the material is studied. In this benchmarking process, the material was studied by listening to the recordings and by reading the notes which were made during the interviews and the transcribed interviews. Expressions pertaining to the research questions were searched inductively from the research material and they were simplified. The simplified expressions were categorised according to basic categories and subcategories. Super categories were abstracted from the concepts using general concepts (Kyngäs & Vanhanen 1999: 3–5).

Implementation of Nursing Simulations

Simulation contents and simulation methods were formed as the super categories of nursing simulation implementation. The simulation contents consist of the nurse's competences and general working-life skills that are stated in the curriculum, the nursing that is based on evidence and patient safety factors. The simulation-related methods include structured simulation situations, scenarios, utilisation of virtual material, in situ simulations, skill stations, various tests and video recording.

Table 1. The technological levels of simulation according to Alinier (2007).

Technological simulation levels	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
Simulation technique	Written simulations includes pen and paper simulations or "Patient Management Problems" and latent images	3-D models which can be a basic mannequin, low-fidelity simulation models or part-task simulators	Screen-based simulators Computer simulation, Simulation software, videos, DVDs, or Virtual Reality (VR) and surgical simulators	Standardized patients Real or simulated patients (trained actors), Role play	Intermediate fidelity patient simulators Computer controlled, programmable full patient simulators not fully interactive	Interactive patient simulators or Computer controlled model driven patient simulators, also known as high-fidelity simulation platforms
Mode of delivery	Usually student led	Student or trainer led	Student or trainer led	Student or trainer led	Preferably trainer led	Preferably student led
Type	Passive		Interactive	Interactive	Partly Interactive	Interactive
Skills addressed	Cognitive	Psychomotor	Cognitive	Psychomotor, cognitive, and interpersonal	Psychomotor, cognitive, and interpersonal	Psychomotor, cognitive, and interpersonal
Facility required	Classroom	Clinical skills room or classroom	Multimedia/ Computer laboratory or classroom	Depends on the scenario requirements	Clinical skills room or simulation centre realistic setting (simulated theatre, ICU, A&E or ward)	Simulation centre with realistic setting (simulated theatre, ICU, A&E or ward) usually set up with audio and video recording equipment
Typical use	Patient management problems Diagnosis Mainly for assessment	Demonstration and practice of skills	Cognitive skills Clinical management Sometimes interpersonal skills (software allowing for a team to interact over networked computers)	Same as Level 2 plus patient physical assessment, diagnostic, or management problems Interpersonal skills	Same as Level 3 plus procedural skills Full-scale simulation training Sometimes used for demonstrations	Same as Level 4
Disadvantages	Unrealistic Feedback cannot be given instantaneously after the exercise	Limited range of training functions No or little interactivity	Unrealistic setting Students and trainers have to be familiar with the software/ equipment Software has to be kept up to date with the relevant medical regulations/procedures VR sometimes requires very high computational power	For small groups of students only Patients have tobe trained and briefed Inconvenient if the exercise has to be repeated many times Not valid for any invasive practice unless used in conjunction with a part-task trainer	May require programming of scenarios Several trainers required for a relatively small group of students Trainers have to be familiar with the equipment Requires an emulated patient monitor for most parameters	Cost (mannequin and facility) Several trainers required for a relatively small group of students Trainers have to be familiar with the equipment Not very portable
Advantages	Low cost (no special equipment required in most cases) One academic may be sufficient for a large number of students	Equipment relatively mobile and always available One academic may be sufficient for a class of students working on the same skill Spares patient discomfort	Relatively low cost, except for VR One academic may be sufficient for a large number of students Students can use it on their own (self learning) Software often provides feedback on performance	Can be very realistic A must for communication skills and patient history taking Allows for truly multiprofesional (sic) training	Provides a fairly realistic experience Can be used to apply a broad range of skills Students' performance sometimes recorded Allows for truly multiprofesional (sic) training Usually portable	Provides a realistic experience Can be used to apply a broad range of skills Students' performance recorded for debriefing Allows for truly multiprofesional (sic) training Can be used with real clinical monitoring equipment

In the TOVI project network organisations, simulation education is given both to undergraduates and health care professionals. The simulation facilities range from laboratory classrooms to separate simulation facilities that consist of several rooms. The level of simulations ranges from low-fidelity simulations to very advanced high-fidelity simulations. Alinier (2007) from the University of Hertfordshire, UK, has developed a six-level categorisation that allows for the observation of the methods pertaining to simulation (see Table 1). Each level has seven criteria for specifying the categorisation further. This framework enables the examination of the effectiveness of the technological simulation level and the resources which it requires.

Basic simulations are conducted in all organisations in the form of skill stations (Alinier's level 1). In addition, all educational organisations implement basic nursing skills (matters pertaining to basic care, such as washing and feeding and clinical procedures, such as blood pressure measurement, nasogastric intubation and medical care) and acute situation management (resuscitation). There is some evidence that shows a significant improvement in manual handling and resuscitation knowledge following simulation (Moule et al. 2006).

In some of the organisations, simulation is always considered as full-scale simulation and well-structured procedural models have been created for them. Simulations are always performed according to the same standards and, thus, full-scale simulation is relatively similar each time regardless of the simulation instructors. In DIMS, for example, full-scale simulations are based on a model which may consist of the following stages: *briefing, simulation* and *debriefing*. Debriefing includes three stages: *description, analysis* and *application* (Steinwachs 1992: 187). The debriefing session is a learning situation in which both the gaining of a nursing competence and critical reflection on learning are observed (Silva, L. & de Sana, R. 2006: 755–756).

Simulation contents especially highlight the patient safety factors that focus mostly on controlling human factor errors and practising teamwork, interaction and leadership. These non-technical skills are learned for example in 'CRM crises resource management' subject areas. The simulations also help learning different patient safety promoting mnemonics, of which the most common is the 'ABCD' rule. Focusing on CRM is one way to reduce human factor errors and learn teamwork (Rall & Dieckmann 2005).

Several organisations have scenarios, i.e. simulation scripts that describe the initial state of a simulated event. These scenarios can be adapted to the needs and objectives of the participants and utilised in the education of students and professionals from various sectors.

In situ simulations are simulations that are conducted in authentic settings. The *in situ* simulations observed in this survey are primarily simulations which are carried out at hospitals. At their simplest, they are first-aid situations in various settings. Haider (2009) states that simulation exercises which are performed in an authentic operational environment, with the students and the nursing personnel working together, benefit both the health care personnel and the students. In the exercises, inner skills and co-operation are practised and perceptions on nursing are shared. Kneebone et al. (2004) consider *in situ* exercises to strengthen competence in practice.

Virtual learning environments (Alinier's level 2) are also regarded as a simulation-related method and include a wide range of applications, from an on-line virtual hospital to a virtual environment. The majority of the organisations have e-learning material of some level; some organisations have very simple self-produced segments, some have an in-hospital programme created by a company. E-learning materials can include video recordings from authentic treatment situations. According to earlier studies (Hakkarainen 2011; Hakkarainen, Saarelainen & Ruokamo 2007), the use of the video in education supports meaningful learning; therefore its use should be increased.

Various tests are also included in the simulation methods. In some organisations, participants must pass a theory test before participating in simulations. In other organisations, the participant's performance in a simulated situation must be approved before commencing a practical training placement. There are differing opinions on using a

Table 2. The implementation of simulations in the TOVI project network

Common theme	Supercategories	Subcategories	Simplified expressions
Implementation of simulation	**Simulation contents**	Simulation in the curriculum	Simulation as part of each practical training placement Simulation in combination with clinical nursing skills Teaching nursing competences and general competences, such as ethical skills, interaction skills, leadership skills, international and cultural skills (general working-life skills)
		Nursing based on evidence	Simulation enables observing theory in practice
		Patient safety factors	Human factors, CRM, ANTS, teamwork, interaction, leadership Mnemonics: ABCD, SBAR, checklists
	Simulation methods	Structured simulation events	Simulations using a recurring pattern (e.g. the model in used in DIMS) Simulation is carried out according to the same procedure regardless of the instructor
		Skill stations	Yearly theme-specific skills and related equipment and self-study material in the skill station class Learning basic nursing skills Treatment of the critically ill patient Acute situation management
		Scenarios	Templates for utilisation with different students or professionals Scenarios adaptable for basic or further education
		In situ simulations	Simulation in a hospital in a real environment Simulation outside a hospital in a real environment
		Utilisation of virtual material	Virtual hospital E-learning material In-hospital programme
		Video recording	Video recording utilised in simulation AV room and video systems for recording Other students can follow simulation situations via video transmission
		Various tests	A theory test must be passed before participating in a simulation A simulation must be performed before practical training

simulated situation as a test (Rall et al. 2008: 32). For learning basic skills in nursing education, using simulation as a test is well-founded. Simulation has proven to be a good test method in learning case history checking during medical studies if a real person, i.e. a standardised patient is used as the patient (Batteles 2004: i47). In practising non-technical skills, simulation is a good learning method but it lacks the grounds for use in testing.

Several organisations of the study are making use of video recording in simulations. Some organisations of the study have a separate AV-room, equipped with video recording devices for recording simulations. In some organisations,

simulations are transmitted live to an auditorium due to large groups and followed there for example by 35 students while 5 are actually participating in the simulation. A debriefing session is held by both groups respectively after the simulation.

Good Practices of Simulation-Based Nursing Education

The good practices of simulation-based nursing education are categorised as factors pertaining to the division of work and as factors pertaining to the operations of the organisation. The division of work includes utilising older students, patient actors and clinical experts and the group size. Factors pertaining to the operations of the organisation include co-operation with a hospital, simulation culture, co-operation with a simulation equipment company, support from the management and networking. (See table 3).

Simulation education differs from traditional education for the teacher as well. Salakari (2009) states that, in addition to the pedagogic method, simulation changes also the subject that is being taught. The role of the teacher becomes more complex, and the teacher must be able to use new kinds of methods. The teacher can be an operator, who controls the physiological functions of a simulator on the basis of the students' actions, or a facilitator, who observes the students' actions and, if necessary, gives realistic cues which are relevant for the simulation and which the simulator cannot provide. (Horn et al. 2007: 67). The teacher must step outside the so-called comfort zone. Although the objectives of simulations are predefined, the learning outcomes of simulated situations may differ.

Division of work was chosen as the second top-level concept under the theme of implementation of simulation. Sometimes, simulation may require other experts in addition to the teacher, for example, clinical experts from the health care sector working life. Older students may also participate in simulations, either as students in order to achieve various learning objectives or as additional facilitators in order to practise instruction skills.

The group size may also affect division of work. Eight is considered the maximum number of participants per simulation. The group sizes in basic nursing studies are large, and various solutions have been developed to control simulation with large group sizes. An auditorium has been used by large groups as a room for watching simulations which are performed by a small group. There is a facilitator present at both places respectively who holds a debriefing after the simulation. At Alinier's (2007) simulation levels 0–2, simulation can be implemented for a large group with one teacher whereas the levels 3–5 require small groups and more facilitator resources.

Simulation education requires interaction and co-operation from students. This is brought up also in connection with the implementation of simulation. Co-operation with clinical experts is needed, and they often are from the local hospital staff. In addition, co-operation with simulation equipment companies is needed. The training and support pertaining to simulators that is provided by these companies is valuable for the educational organisations, and the companies receive the necessary feedback for further product development. Simulation education requires strong support from the management of the organisation to enable its versatile utilisation. Simulation education is expensive and requires a lot of physical resources. Positive support from the management is considered as very significant in the TOVI network.

Simulation cultures are realised in the organisations as various rules. A simulation culture includes instructions regarding behaviour and procedures, which are often listed as a set of rules. The non-disclosure obligation, which is an important principle in nursing, applies to simulations as well. Simulations shall not be discussed outside the simulation exercise to ensure that the atmosphere remains confidential and safe, which is a prerequisite for learning. Mistakes are allowed and they are discussed in more detail during the debriefing. Confidentiality of scenarios gives every student the equal opportunity to make their personal decisions in the simulation, which ensures that no one is deprived of learning experiences. (Hale & Ahlschlager 2011.) One of the organisations has commenced theoretical research on simulation-based learning. In the research, a simulation environment is defined as a borderline system, i.e. 'the third room' (Yliniemi 2011).

Table 3. The good practices in the TOVI network organisations.

Common theme	Supercategories	Subcategories	Simplified expressions
Implementation of simulation	**Division of work**	Participation of older students	Older students as operators in simulations Older students as tutors in skills labs Older students as students of e.g. leadership (common simulations, different objectives)
		Patient actors Standardised Patients (SP)	Hired actors in simulations Volunteers from the internet Volunteers from patient associations Experience trainers
		Clinical experts	An instructor from the practical field / a local hospital An expert from a nearby hospital as a tutor Co-operation with the practical field regarding the content of simulation
		Group size	10–12 students, the same group throughout education Full Scale 4–7 participants Large group via the video
	Operations of the organisation	Co-operation with a hospital	Common simulation facilities and equipment Common staff in simulations Authentic situations and experts from a hospital
		Simulation culture	Non-disclosure obligation Confidentiality Rules regarding, e.g. clothing The 'third room' ideology
		Co-operation with a simulation equipment company	Product testing and development Usage training Technical support regarding simulators
		Support from the management	Financial support Mental support Education possibilities
		Networking	Networking with other simulation centres Networking with hospitals Networks that reach the level of decision-making in the society

Summary of the Results and Conclusions

Simulation education is regarded as a method that can help meet the competence requirements of today and the future. According to Long (2003), learning competences thoroughly requires understanding and application of the guidelines of good practices, in addition to learning of skills. The guidelines include ethical competence, interaction and making the nursing process visible. Simulation-based learning enables practising the guidelines. An expensive mannequin and a realistically staged setting alone cannot ensure learning. Ethical nursing education that pursues patient safety requires work contributions of several instructors and the co-operation between organisations of different fields. It is also important to be aware of the technological level of simulation (Alinier 2007) required in a given situation to ensure that resources are allocated appropriately.

In order to meet the above-mentioned prerequisites, simulation education has to undergo a cultural change, on which the management of the organisation can have a significant impact. In Ahonen's (2008) terms, the concept of change leadership needs to be replaced with the concept of learning leadership. Learning leadership is topical in organisations which produce and convey knowledge. Networks are formed in organisations that implement learning leadership, and the latest information is provided to other actors via the network for use and editing. By sharing experiences and views, the TOVI network has created good practices that are significant for successful simulation, and we hope that we will have the chance to implement them in the best possible way for our field. The impact of the good practices should be studied in the future.

References

Ahonen, H. (2008) *Oppimisen kohteena ja oppijan vuorovaikutus. Teleyrityksen asiakaspalvelun työyhteisöjen oppimiskäytäntöjen uudistaminen osana teknologis-taloudellista kumousta,* Helsingin yliopisto, Kasvatustieteen laitoksen tutkimuksia 218, pp. 144–146, Helsinki: Yliopistopaino.

Ahonen, H. (2009) 'Muutosjohtamisesta oppimisen johtamiseen', in Sinikaira, K., Forsman, M., Karppinen, I. & Lammi, P. (eds.) *Rajapinnassa,* pp. 144–150, Helsingin yliopisto.

Alinier, G. (2007) 'A typology of educationally focused medical simulation tools', (e243–e246), *Medical Teacher,* Web paper, 29, Available: http://informahealthcare.com/doi/pdf/10.1080/01421590701551185

Amitai, Z., Wolpe, P. R., Small, S. D. & Glick, S. (2003) 'Simulation-Based Medical Education: An Ethical Imperative', *Academic Medicine,* vol. 78, no. 8, August.

Battles, J. B., Wilkinson, S. L. & Lee, S. J. (2004) 'Using Standardised patients in an objective structured clinical examination as a patient safety tool', *Qual Saf Health Care,* 13 (Suppl 1): i46–i50.

Camp, R. C. (1989) *Benchmarking. The search for industry best practices that lead to superior performance,* USA: ASQC Quality Press.

Engeström, Y. (2001) 'Expansive Learning at Work: toward an activity theoretical reconceptualization', *Journal of Education and Work,* vol. 14, no. 1.

Engeström, Y. & Sannino, A. (2010) 'Studies of expansive learning: Foundations, findings and future challenges', *Educational Research Review,* pp. 12–16 , doi:10.1016/j.edurev.2009.12.002.

Haidar, E. (2009) 'Clinical simulation: a better way of learning', *Nursing Management,* vol. 16 (5), pp. 22–23.

Hakkarainen, P. (2011) 'Promoting Meaningful Learning through Video Production-Supported PBL', *The Interdisciplinary Journal of Problem-Based Learning,* vol. 5, no. 1 (spring), pp. 34–53, Available: http://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1217&context=ijpbl [19.8.2011].

Hakkarainen, P., Saarelainen, T & Ruokamo, H. (2007) 'Towards meaningful learning through digital video supported case based teaching', *Australian Journal of Educational Technology,* 23 (1), pp. 87–109, Available: www.ascilite.org.au/ajet/ajet23/hakkarainen.html [19.8.2011].

Hale, T. J. & Ahlschlager, P. M. (2011) *Simulation scenarios for nursing education,* Delmar, NY, USA.

Hirsjärvi, S., Remes, P. & Sajavaara, P. (2008) *Tutki ja kirjoita,* Tammi.

Horn, M. & Carter, N. (2007) 'Practical suggestions for implementing simulations', in Jeffries, P. (ed.) *Simulation in Nursing education – from conceptualization to evaluation,* pp. 21–33, New York: National League for Nursing.

Härkönen, A., Juntunen, K. & Pyykkönen, E-L. (2002) *Kajaanin ammattikorkeakoulun yrityspalveluiden benchmarking,* Helsinki: Edita.

Jeffries, P. (2007) *Simulation in nursing education – From conceptualization to evaluation,* New York: National league for Nursing.

Kaartinen-Koutaniemi, M. (2002) *Korkeakouluopiskelijoiden harjoittelun kehittäminen. Helsingin yliopiston, Diakonia-ammattikorkeakoulun ja Lahden ammattikorkeakoulun benchmarking-projekti,* KKA julkaisu 7:2002, Helsinki: Edita.

Kneebone, R. L., Scott, W., Darzi, A. & Horrocks, M. (2004) 'Simulation and clinical practice. Strengthening the relationship', *Medical Education,* vol. 38, pp. 1095–1096.

Kulmala, J. (1999) *Benchmarking ammatillisen aikuiskoulutuskeskuksen toiminnan kehittämisen välineenä,* ACTA Universitatis Tamperensis 663, Vammalan Kirjapaino Oy.

Kyngäs, H. & Vanhanen, L. (1999) *'Sisällön analyysi',* Hoitotiede-lehti, vol. 11, no. 1/99, pp. 3–12.

Long, D. (2003) *Competence-based training in neurosurgery: The next revolution in medical education.*

Moule, P., Wilford, A., Sales, R. & Lockyer, L. (2006) *Can the use of simulation support pre-registration nursing students in familiarising themselves with clinical skills before consolidating them in practice?*, November, Available: http://hsc.uwe.ac.uk/net/research/Data/Sites/1/GalleryImages/Research/NMC%20Final%20Report%20UWE.pdf [2.12.2011].

Rall, M. & Dieckmann, P. (2005) *Crises Resource Management to Improve Patient Safety*, European Society of Anaesthesiology, Vienna, Austria, 28–31 May.

Rall, M., Gaba, D., Dieckmann, P. & Eich, C. (2008) 'Patient Simulation', in Miller, R. D., Erikssen, L. I., Fleisher, L. A., Wiener-Kronish, J. P. & Young, W. L., *Miller's Anesthesia*, 7th edition, Churchill Livingstone

Salakari, H. (2009) *Toiminta ja oppiminen – koulutuksen kehittämisen tulevaisuuden suuntaviivoja ja menetelmiä*, Eduskills Consulting, Helsinki: Hakapaino Oy.

Silva, L. & de Sana, R. (2006) 'Nursing education: seeking critical-reflective education and professional competences', *Latino-am. Enfermagem*, vol. 14 (5).

Steinbach, B. (1992) 'How to Facilitate a Debriefing', *Simulation & Gaming*, vol. 23, no. 2, June, pp. 186–195.

Ziv, A., Root, P., Small, S. & Glick, S. (2003) 'Simulation-Based Medical Education an Ethical Imperative', *Academic medicine*, vol. 78 (8).

Yliniemi, P. (2011) 'In 'The Third Room' patient's safety is secured by ethical based nursing', an abstract in *Book of abstracts*, SESAM 2011.

Nurse Education in Fulda: Simulation as a Means to Attain Clinical Competence

➥ JOHANNES KEOGH, CHRISTINE LOEWENHARDT, DANIELA HERCHET & HELMA BLESES

Introduction

There has been a paradigm change in nurse education, specifically in clinical education. Previously, clinical teaching was very much "hands on" and mainly hospital based. This has changed due to the complex nature of modern nursing, as well as the need to provide nursing care in a variety of clinical settings (McIlfatrick 2003). Students now have to acquire clinical competences instead of merely learning skills.

At the same time, patient safety has gained enormously in importance during the past two decades. This is due to recognised medical and nursing errors, leading to patients dying in hospitals and in the community. Callum et al. (2001) has indicated 366 deaths or serious complications that had been possibly caused by transfusion errors in the UK and Ireland during 1996–1998. Furthermore, Wachter (2004:535) states that 44,000–98,000 deaths in the USA per year are due to medical errors. In order to prevent these mistakes, clinical education must be directed at increasing patient safety while ensuring clinical competence of the students of all health care professions.

Defining Simulation

Waldner and Olson (2007) cite the work done by Rauen (2004:46), and define simulation in nurse education as follows: "...an event or situation made to resemble clinical practice as closely as possible".

Seropian, Brown, Galvanes and Driggers (2004) subdivide simulation in nurse education into three categories:

1. Computer-steered Simulation: *"the use of software developed to simulate a subject or situation"* (Seropian et al. 2004:166).
2. Task and skill trainers: *"models of varying completeness and realism such as an IV arm or a computer driven human patient simulator used to practice skills"* (Seropian et al., 2004:168).
3. Full-scale Simulation with the aim *"to recreate all the elements of a situation that are perceptible to students"* (Seropian et al. 2004:168).

The above-mentioned authors all agree that the 3 types of simulation can be implemented using simulators, but also model patients, patients, actors and colleagues for the simulation exercises.

Furthermore, the definition also refers to "Task and Skill trainers", which can be found in several formats:

1. Low-Fidelity Trainers which were developed to acquire certain skills, for example the I.V. arm, simulators to teach intramuscular injections, etc. (Yaeger et al. 2004; Wilson, Shephard, Kellys and Pitzner 2005).
2. Medium- and Moderate-fidelity simulators which appear more real and include heart and lung sounds or have a palpable pulse. Medicines can be administered by a computer,

showing the effects of the medicines as well (Seropian et al. 2004; Yaeger et al. 2004).

3. High-Fidelity simulators that can be resuscitated.

Waldner and Olson (2007) indicated that the "Fidelity" of the simulators will increase in the future as the simulators are becoming more sophisticated.

Introducing High-Fidelity Simulation in Clinical Nurse Education in Fulda, Germany

The nursing curriculum of the Department of Nursing and Health sciences at the Fulda University of Applied Sciences was re-validated in 2010. Simulation of nursing scenarios was included in all the nursing-related modules, thus assisting students to acquire the competences that are necessary for professional recognition.

Background to the Project

Health care systems worldwide are facing patients with high acuity levels, and due to financial constraints, there is also pressure on the services to discharge patients as quickly as possible. This shortens the patient stay, which puts strain on the health care professionals to prevent the readmission of these patients. The staff has less time to support new nursing students than before, which complicates the process of acquiring clinical skills. Scenario-based education offers students the opportunity to learn in a safe environment, to make mistakes and to learn from these mistakes, to find methods of preventing these mistakes in clinical practice and to improve their confidence in approaching patients in clinical settings (Hovancsek 2007). It is therefore possible to say that simulation-based education aims at increasing patient safety during the clinical phases of the programme.

The decision to change the approach in clinical education was based on the above-mentioned factors. Furthermore, the selection of an alternative approach to teaching clinical material was also necessitated by certain developments within Germany, which can be summarised as follows:

a) The results of a student evaluation of the teaching and learning situation within the Department.
b) Current developments within the health sector in Germany, and the resultant demands concerning the nursing profession.
c) Developments within the Department as contribution to the academic development of all health care professions.

The findings of the student evaluation led to an increase of clinical teaching hours in the new curriculum. In the 2010 curriculum, the clinical teaching component was increased to encompass 21 ECTS (approximately 630 hours). Most of this will be done in the skills-labs and lecture theatres of the Department.

Recent developments in health care and educational and institutional settings all have an impact on the theoretical and clinical education of students within the health care professions. The developments were particularly influenced by the following factors:

1. The German Council of Experts.

The Council published a report in 2007 referring specifically to improving the quality of nursing, including patient safety. The report included 31 patient safety indicators. Health care institutions were also requested to systematically document their safety indicators and to develop and implement risk management interventions.

The report also stated that:

- There should be a new division of tasks between the health care professions, aiming at better cooperation between the professions
- The significance of education (basic, continuous and in-service) is recognised
- The medical profession must transfer some interventions to the nursing profession
- Academic education for all the health care professions must be developed and implemented
- Patient safety and the quality of care must be improved

Even though the importance of patient safety was recognised, no explicit mention was made about teaching methods that would enable nursing students to reach this goal. A number of patient safety indicators were specifically identified for the nursing profession. These include the prevention of:

- Pressure sores
- Anaesthesia complications
- Postoperative pulmonary Embolism, and deep-vein thrombosis
- Wound infections
- Pneumonia due to ventilation
- Intravascular and urinary tract infections due to urinary catheters and drainage tubes
- The occurrence of medicinal and transfusion errors
- The occurrence of Obstetric trauma (Sachverständigungsrat 2007:109).

2. The Act for Further Development of the Nursing Profession (2008) (Pflegeweiterentwicklungsgesetz)

The Act for Further Development of the Nursing Profession was published in 2008, with the implication that registered nurses can be allowed to prescribe wound treatment materials as well as other nursing materials. The act also allows nurses to decide the extent of home nursing interventions autonomously, including certain interventions previously falling exclusively within the medical domain. It also allows nurses to implement autonomous therapeutic interventions as long as the nurses are qualified for these interventions through continuous education programmes (Article 6 of the amended 5th Code of Social Law [5. Sozial Gesetzbuch]).

3. Introducing New Specialisation Programmes for Nurses

The development of specialisation disciplines in nursing has a big influence on the professional image of nurses in Germany. Specialisation fields, such as advanced practice nursing, nurse practitioners, clinical nurse specialists and wound care nurses were previously unknown, and will have a deciding influence on nurse education in the next 5 years (Landenberger 2009; Deutsches Netzwerk für ANP 2009; DBR).

4. Nursing Shortage:

Certain changes in the staffing patterns within hospitals and other health care institutions, especially in the care of chronically ill patients and people needing residential care, will also have a big influence on nursing education programmes.

The above-mentioned factors all have an impact on the development of the educational programmes offered within the Department of Nursing and Health Sciences. For the discipline of nursing, the most important change in the curriculum was the change from "demonstrating" certain techniques to students to them actively participating in their own learning process. This "adult education" approach is, amongst others, supported by the theoretical approach underpinning the clinical teaching in the Department.

By actively participating in all the clinical teaching sessions, students have the opportunity to learn within a safe environment. It gives the student the opportunity to identify possible errors in their nursing interventions in the skills-laboratories, and to implement corrective actions timeously.

The Department of Nursing and Health Sciences has been developing and expanding its simulation laboratories for the past 15 years. Implementing high-fidelity simulation as an educational strategy was seen as a means of linking theory and practice in a more meaningful way. However, preparing the laboratories for simulated scenarios required major structural changes. The process of equipping and rebuilding the laboratories has now been concluded. The laboratories were redesigned, a support room was built and technical support for the high-fidelity simulators, as well as cameras for filming the students during the simulation sessions, were installed. This was done to enable video-debriefing with the lecturers.

The educational concept for implementing high-fidelity simulation must be theoretically underpinned and embedded in the curriculum.

To this effect, the lecturing staff analysed several educational theories in support of the clinical teaching components within the Department.

Theoretical Support for Clinical Teaching

Before discussing the theoretical underpinning of any concept in a curriculum, it is also necessary to define a curriculum. Leddy (2008:68) made the following statement about curriculums:"*... curriculum is the totality of formal and informal content that imparts the skills, attitudes, and values considered important in achieving specific educational goals*".

The success of the above mentioned components is mainly achieved by setting educational programme objectives, which are further subdivided into level and course objectives. This is important, as embedding high-fidelity simulation in teaching programmes necessitates determining the goals and objectives of each module or study unit, and how these objectives will be reached through the usage of high-fidelity simulation (Nehring 2010). This is due to the fact that the outcomes of the learning experience for both the student and the lecturer will be determined by the extent to which the objectives were achieved.

The educational model of Benner (1984) is most widely used in institutions in which simulation has already been implemented in nursing curriculums. Researchers in the field of simulation have often based their research on Benner's model. Nehring (2010) cites some of these projects, for instance Ferguson et al. (2004), Long (2005), Larew et al. (2006), Waldner and Olson (2007), etc. Finding the suitable approach for one's own curriculum can therefore be a daunting challenge. However, two models require mentioning, as they can be used quite effectively in nurse education.

1. *The Nursing Education Simulation Framework of Jeffries and Rogers (2007)*
   This model is widely used within the United States of America, and it is based on three spheres:
   - Lecturers and students combine the educational practices within the department, which forms the first sphere
   - This combination will influence student outcomes, which are classified as the second sphere
   - Finally, the characteristics of the simulation design are called the third sphere (Nehring 2010).

2. *Critical Incident Nursing Management (CINM) by Nehring and Lashley (2004)*
   This model builds on the Anaesthesia Crisis Management model, which was developed by Gaba, Fish and Howard (1994) and is mainly used in Anaesthesiology.

   CINM includes both internal and external factors having an influence on the performance of nurses. Nehring and Lashley (2004) stated to this effect: "*... given a critical incident in a patient, such as a myocardial infarction, the nurse's actions are influenced by the antecedents and consequences of the critical incident, the members of the health care team, and the environment, in addition to the nurse's characteristics, such as fatigue" (Nehring 2010:29).*

   This model was developed for critical incidents, and can be used in simulating non-critical nursing interventions as well, but due to its original nature, it is more complicated to implement comprehensively in all nursing situations.

The lecturers in the Department of Nursing and Health Studies decided to use a more eclectic approach. This was done, because using simulation is based on the following approach in teaching nursing through simulation:

1. Case reconstruction,
2. Developing critical thinking skills,
3. Implementing a problem solving approach to identify the patient's problems, and find solutions for these in cooperation with the patient, while
4. Applying communication skills,
5. Understanding the student's linguistic skills,
6. Support students in developing questions that will support their learning,
7. Testing their prior learning and knowledge, as well as
8. Challenge them to actively get involved in the case study at hand (Mietzel 2001) , while

9. Considering the theoretical grounds that contribute to the current health problem, such as psychological or sociological theories influencing the decisions about nursing care.
10. Furthermore, lecturers have to develop concrete tasks for students.

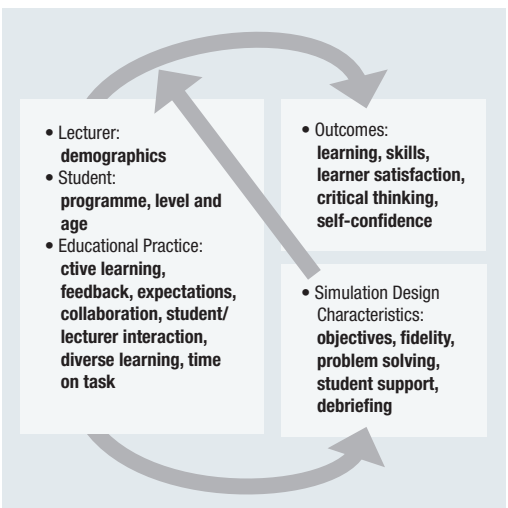
All of this must be done within the framework of the nursing process.

As already indicated, simulation exercises should promote the student's problem solving skills. The reconstructed case-study will increase in complexity each semester. During the 6th semester the students will be expected to solve and provide nursing care in complex situations. The selection of the simulation exercises must therefore be done carefully in order to demonstrate this growing complexity. This will enable the students to explain and demonstrate their abilities as developing experts (the so-called "cognitive apprenticeship") (Seel 2003).

For the purposes of the Fulda curriculum, the Framework for Simulation in Nurse Education by Jeffries and Rogers was deemed to be the most compatible with the educational approach in our department. The framework can be presented diagrammatically as follows:

The complexity and interactivity of this framework is clearly demonstrated above. Several components contribute to the framework, and the success of simulation in nurse education. Jeffries and Rogers (2007) describe the individual components in detail, but for the purpose of this paper, the components are described only briefly.

Diagram 1: Framework for Simulation in Nurse Education (Own construction according to Jeffries and Rogers 2007:23)



Components of the Framework for simulation in Nurse Education

The Lecturer

Lecturers are mostly considered to be essential for the success of the student's learning experience. A paradigm shift is necessary for the success of any education programme that uses simulation, namely, the shift away from lecturer-centred teaching to student-centred teaching. The lecturer has to take on the roles of facilitators and evaluators (Jeffries and Rogers 2007).

Lecturers must feel comfortable with the situations that they are teaching, as well as simulation procedures in general (Jeffries and Rogers 2007), or they will not appear plausible to the students, leading to a definite failure of the particular session.

The Student

Introducing simulation exercises in education programmes can be a challenging experience for students. The student is expected to take responsibility for their own learning, which might be a daunting experience for a young student. Students are expected to be motivated during lecture sessions, and their learning must be self-directed. The student takes on several roles during lecture sessions and can sometimes be the responsible nursing person, sometimes an observer, sometimes an assistant or may take on specific roles in role-playing exercises (Jeffries and Rogers 2007).

However, students might be expected to participate in activities that are designed to evaluate their progress in the programme. Procedures can be filmed, and students can be expected to view the videos and evaluate their own progress. This might also be a challenge to the student (Jeffries and Rogers 2007).

Educational Practices

Educational practices mainly refer to the concepts of active learning, diverse learning styles,

collaboration and high expectations of both lecturers and students. These components are all important in ensuring the success of simulation in any education programme.

Characteristics of the Simulation Design

These characteristics have been mentioned before. They include the setting of objectives, the fidelity of simulators (low-, medium- and high-fidelity simulators), the development of problem-solving, the development of the reflective thinking skills of students through debriefing and providing student support. In order to enable the evaluation of the success of the new approach, its outcomes must be clearly identified and stated before the programme commences (Jeffries and Rogers 2007).

In addition to the framework that was adopted within the department, the model developed by Kaiser and Kaiser (1998) was included in our approach, because it supports some of the components of the Framework by Jeffries and Rogers (2007). These components in the model of Kaiser and Kaiser (1998) include:

- Contact between lecturers and students
- Theoretical and clinical input
- Demonstrating the nursing interventions
- Students practicing the interventions
- Using the correct (subject) terminology
- The interaction between students, as well as between students and lecturers
- Lecturers and students discussing the content
- Information exchange between participants about known nursing situations
- Reflecting the learning situations (Kaiser 1998)

From this framework it is quite clear that implementing high-fidelity simulation in any curriculum requires careful planning, and without considering an educational framework, as well as using a very broad-based educational approach. It is essential that students learn problem-solving skills, but also use critical thinking skills, and take responsibility for their own learning. Setting the outcomes for the programme before commencing the programme is also extremely important in order to enable the development of proper assessment strategies and the evaluation of the success of the new teaching and learning approach.

Implementing the Simulation in the Nursing Curriculum

Students receive a set of guidelines for clinical education at the beginning of the first semester, which contains relevant information and literature. These guidelines are presented in the form of a work book. The book contains all the literature that is needed for the theoretical part of the clinical teaching, and the transfer into clinical practice is done in the laboratories during the simulation exercises. Students are expected to prepare for the laboratory exercises using the provided guidelines.

Clinical exercises have been implemented in the Bachelor Programme in 8 modules covering a total of 21 credits, or approximately 630 hours. Simulation exercises were introduced in further modules, but these were not included in the calculation for clinical teaching per se. One example would be the module on complex nursing situations, in which simulation is used purely for the sake of case reconstruction and observing the student's problem solving skills in complex nursing scenarios.

The focus of clinical teaching during the first two semesters is on learning and practicing skills necessary for general nursing interventions (such as giving injections, patient hygiene etc.). As the programme progresses, the complexity of the nursing interventions increases and the student has to implement advanced clinical skills, as well as problem solving and critical thinking skills in order to find solutions for the patient problems. This is in agreement with the education framework previously described.

Teaching is organised mainly through case studies. The case studies are constructed to include a variety of nursing settings, such as acute care in hospitals, residential care and home nursing settings. These are the clinical settings where students will be completing their clinical placements during the programme. Students are expected to participate in simulation exercises both as intervening nurses and as model patients. This enables them to experience nursing interventions from the patient's point of view. However, certain procedures can only be done on simulators, such as transurethral catheters etc., which can be simulated using medium-fidelity simulators to increase the complexity of the learning situation.

During simulation exercises, students will be expected to draw on their prior knowledge, while applying the new theoretical background that is provided during the lecture sessions preceding the exercises. By doing so, students will be able to acquire new clinical competencies, but also be able to apply the competences and skills that they have acquired previously. This is consistent with the theoretical framework that has been chosen for this curriculum.

Simulation exercises were developed according to a pre-decided scheme. The lecturer writes the scenario beforehand and incorporates the following components into the scenario:

1. An overview of the scenario, including:
    - The approximate time needed to complete the exercise AND do the debriefing
    - A short summary of the case
    - The objectives
    - Necessary components to be included, such as prior knowledge, specific instructions, for example medication management
2. A patient report to be given to the student, including time and clinical symptoms
3. All other relevant patient data, including date of birth and medical history
4. A checklist for all required equipment, such as materials, documentation forms, medicines and available laboratory reports
5. The preparation of the High-Fidelity Simulator (What should be done)
6. The number of participants as well as each person's name
7. A precise documentation of the intervention, including time limits, but without a dialogue
8. On a separate page: a list of the correct nursing actions
9. The correct nursing diagnoses
10. A schematic preparation for the debriefing (the National League for Nursing, Example: Hughes, M., Lower Leg Fracture – basic assessment)

When commencing the exercise, it is important that the simulator is prepared or the model patient is adequately informed. The situation must be prepared as realistic as possible, which supports the use of "moulage" to prepare simulators as realistic as possible. This is important especially for the pre-registration student. In advanced programmes, such as Master's degree programmes, students know what to expect in real life, and the "reality" of the situation loses its importance against applying new skills.

In trauma cases one can simulate the whole situation through the use of moulage, by using realistic looking blood, pieces of glass in wounds, etc. There are also ways to simulate burns, skin flaps, etc. (Horn 2007). Students are expected to provide nursing care to the simulator in a team context, and each student should know their individual roles. They might need briefing before commencing the exercise and should have the opportunity to ask questions. If necessary, a pre-test can be organised to determine the extent of their prior knowledge. Nursing uniforms should be worn while performing simulation exercises. It is important the student is given the opportunity to complete the exercise without being interfered by the lecturer. This gives students the opportunity to develop their problem-solving and critical-thinking skills while completing the expected nursing interventions. Ideally registered nurses, medical doctors and other support personnel should be available during the exercises. The student may interrupt the procedure or ask for support at any time (Horn 2007). From this, it is clear that students have the opportunity to self-direct their learning, to develop their own skills and to learn to function within a team, which is also important.

The patient handover is done at the "patient's" bed, and each student then takes on their allocated role within the procedure. From that point onwards students become the "responsible care-givers" for the patient. When "model-patients" are being used, certain situations cannot be simulated, for example a low PO2, a myocardial infarct, stroke or unwanted reactions after medications have been given. All procedures are usually filmed in order to provide a basis for the debriefing.

Historically, debriefing was developed for military purposes. The successes and failures of military interventions were discussed in order to learn from the mistakes that were made (Lederman 1992).

Debriefing is an integral part of the whole procedure (Lasater 2007), but it is also the

concluding phase of the simulation exercise (Peters and Vissers 2004). Peters and Vissers (2004) state that the student's behaviour is also evaluated in this phase. Debriefing should be done as soon as possible after concluding the exercise and consist of a goal-oriented discussion between the lecturer and the students involved about their experiences during the exercise (Lasater 2007).

Lasater (2007) indicates that simulation happens at the cognitive level and can lead to positive but also to negative experiences. The students should therefore be given the opportunity to reflect on their experience, which constitutes the real learning experience. This is also supported by Johnson-Russell and Bailey (2010), as they see debriefing as the end to a learning situation and as the time when the student has the opportunity to consolidate their knowledge, hence the debriefing being the time when learning actually takes place.

Bricker and Pardee (2011) indicate that debriefing is a safe and non-threatening situation where students can learn from their mistakes. Simultaneously, lecturers have the opportunity to observe the students and identify their problem-solving skills (Kuiper et al. 2008).

Important for all debriefing situations, is the presence of a support person or facilitator (Lasater 2007). This person plays an important role especially if students' interventions lead to a negative response. Some authors (e.g. Millis 2002) stated that students should be protected against negative experiences, particularly directly after the occurrence of mistakes.

Lederman (1992) described 7 elements of debriefing:

1. Support person (Facilitator)
2. Participants
3. Experience
4. Impact
5. Feedback
6. Reflection
7. Time

Lederman (1992) also describes the steps of the debriefing process:

- First, introducing the participants to their own reflective actions
- Second, an intensive dealing with personal processes
- Third, the generalisation of findings by identifying certain patterns, or measuring one's own performance against those of fellow students.

Debriefing can indicate to the student whether there is a difference between their performance and the set objectives. This enables students to identify their own mistakes and helps them to identify alternative possibilities to discover the correct actions (Peters and Vissers 2004).

We decided to transmit the simulated exercise to the rest of the class in an adjacent lecture theatre, giving them the opportunity to observe their fellow students and participate in the debriefing process. We also film the simulation exercises simultaneously. During the debriefing situation, the rest of the class is asked to comment on their experience of the scenario, and the film material is then used in support of the formal debriefing with the participants of the scenario.

Medium- and high-fidelity simulation in teaching have now been implemented within the department. The lecturers have recognised the need for high-quality clinical teaching. Traditionally students were presented with large amounts of lecture content, but the clinical application lacked to a certain extent. This proved to be a problem for both students and lecturing staff, as graduates were often clinically uncertain when faced with the realities in nursing practice. This was mentioned by students during the formal student and graduate evaluations and concurs with the findings of Jeffries and McNelis (2010).

The next step in the process would be evaluating the implementation phase of the simulation concept. Although the lecturers are convinced that this approach to clinical teaching is the right decision, and the preliminary results are promising, the curriculum will have to be implemented at least for one complete cycle before a formal evaluation can be effectively conducted. However, Jeffries and McNelis (2010) warn that the outcomes of high-fidelity simulation in clinical teaching have to date not been adequately evaluated. This will be the next challenge in the curriculum implementation phase at the Department of Nursing and Health Sciences.

Conclusion

Implementing simulation of nursing scenarios in the curriculum to enhance clinical competence and patient safety can never be concluded. It has to be an on-going process of further improvement and development and requires further research particularly in the field of clinical education.

At the Department of Nursing and Health Sciences, we envisage measuring our first results when the first students of the new programme graduate. We will then be able to indicate how successful our approach has been by measuring the clinical competence of our graduates.

References

Bricker, D. J. and Pardee, C. J. 2011. Nurse experts jump-start clinical simulation in rehabilitation nursing: Supporting new graduate transition to competence *Nursing Education Perspectives, 32(1): 34–36.*

Callum, J. L., Kaplan, H. S., Merkley, L. L., Pinkerton, P. H., Fastman, B. R., Romans, R. A., Coovadia, A. S. and Reis, M. D. 2001. Reporting of near-miss events for transfusion medicine: improving transfusion safety, Transfusion, 14: 2104–1211.

Decker, S. 2007. Simulations: Education and ethics. IN: Jeffries, P. Ed. 2007. *Simulation in nursing education. From conceptualization to evaluation.* , New York: National League for Nursing, pp. 11–19

Deutsche Bildungsrat für Pflegeberufe. *Hrsg.* 2010. Pflegebildung offensiv – zur Gestaltung der beruflichen Qualifizierungen in der Pflege, Berlin: DBR.

Deutsches Netzwerk für ANP 2009, http://www.dnapn.de/?page_id=24.

Horn, M. 2007. Practical suggestions for implementing simulations, IN: Jeffries, P. (ed.) *Simulation in nursing education. From conceptualization to evaluation,* National League of Nursing. 59-72

Hovancsek, M.T. 2007. Using simulations in nursing education. IN: Jeffries, P. (ed.) *Simulation in nursing education. From conceptualization to evaluation*,National League of Nursing. 1-19.

Jeffries, P. and McNelis, A. M. 2010. Evaluation. IN: Nehring, W. M. and Lashley, F. R. *High-fidelity patient simulation in nursing education*, Sudbury, Mass.: Jones and Bartlett.

Jeffries, P.R. & Rogers, K.J. 2007. Theoretical framework for simulation design. IN: Jeffries, P. (ed.), *Simulation in nursing education. From conceptualization to evaluation,* National League of Nursing, pp. 21–34.

Johnson-Russell, J. & Bailey, C. 2010. Facilitated debriefing. IN: Nehring, W. M. and Lashley, F. R. *High fidelity patient simulation in nursing education,* Sudbury, Mass.: Jones and Bartlett.

Kaiser, A. ; Kaiser, R. 1998. Studienbuch Pädagogik. Grund- und Prüfungswissen, Berlin: Cornelsen

Kuiper, R. A., Henrich, C., Matthias, A., Graham, M. J. and Bell-Kotwall, L. 2008. Debriefing with the OPT-model of clinical reasoning during high fidelity patient simulation, *International Journal of Nursing Education Scholarship, 5(1)*.

Landenberger 2009. Erweiterte Praxis- Eine neue Qualifikationsebene der Gesundheits- und Pflegeberufe, http://www.medizin.uni-Halle.de/pflege/media/Vortraege/Landenberger%20Vortrag_05.11._sicher.pdf. (28.12.2009). Lasater, K. L. 2007. High-fidelity simulation and the development of clinical judgement: students' experience, *Journal of Nursing Education*, 46(6): 269–276.

Lasater, K.L. 2007. High-fidelity simulation and the development of clinical judgement: students' experience, *Journal of Nursing Education*, 46(6): 269–276.

Lederman, L.C. 1992. Debriefing: Toward a systematic assessment of theory and practice, *Simulation Gaming*, 23. http://sag.sagepub.com/content/23/2/145.

Leddy, S. 2008. Curriculum Development. IN: Moyer, B.A. and Wittmann-Price, R.A. (Eds.) *Nursing education: Foundations for practice excellence*, Philadelphia: Davis.

Mcilfatrick, S. 2003. The future of nurse education: Characterised by paradoxes, *Nurse Education Today*, 24: 79–83.

Mietzel, Gerd 2001. Pädagogische Psychologie des Lernens und Lehrens. 6. korrigierte Auflage. Göttingen, Bern, Toronto, Seattle: Hogrefe.

Nehring, W.M. 2010. A synthesis of theory and nursing research using high-fidelity patient simulation. IN: Nehring, W. M. and Lashley, F. R. *High-fidelity patient simulation in nursing education*. Sudbury, Mass.: Jones and Bartlett, pp. 27–56.

Peters, V.A.M. & Vissers, G.A.N. 2004. A simple classification model for debriefing simulation games, *Simulation Gaming*, 35, http://sag.sagepub.com/content/35/1/70.

Pflege-Weiterentwicklungsgesetz Bundesgesetzblatt 2008. vol. 1, nr. 20, http://www.bgblportal.de/BGBL/bgbl1f/bgbl108s0874.pdf.

Sachverständigenrat zur Begutachtung der Entwicklung im Gesundheitswesen 2007. Kooperation und Verantwortung. Gutachten Kurzfassung, http://www.svr gesundheit.de/Gutachten/Gutacht07/Kurzfassung%202007.pdf.

Seel, Norbert M. 2003. Psychologie des Lernens. 2nd edition, München: Ernst Reinhardt. Wachter, R. M. 2004. The end of the beginning: Patient safety five years after "To Err Is Human", *Health Affairs*, 4: 534–545.

Waldner, M.H. & lson, J.K. 2007. Taking the patient to the classroom: Applying theoretical frameworks to simulation in nursing education, *International Journal of Nursing Education Scholarships*, 4(1).

Implementing a Dynamic Model for Learning Through Simulation Embedded in the Authentic Clinical Hospital Setting for Nursing Students

➥ HANNE SELBERG, JETTE HOLTZMANN, JETTE HOVEDSKOV

Introduction

Changes in nursing education in Denmark towards an academic approach with more theory and less practical training has resulted in discussions regarding the lack of practical skills amongst novice nurses. Due to reduced possibilities of practicing in the clinical setting The Danish Ministry of Education has recommended the use of simulation in nursing education to compensate for the lack of practical skills and to minimize the risk of adverse incidents and to improve patient safety (Danish Ministry of Education, 2008).

Furthermore, it is necessary to consider new learning strategies in order to prepare nurses to navigate in an increasingly complex clinical setting.

A study of students who had dropped out from nursing education has stated that difficulties in combining theory and practice are one of the reasons for dropping out (Jensen 2008).

Simulation has been used for decades in many health care educations and has been experienced to enhance the learning outcome for students in a safe environment. Students develop clinical skills and improve performance, and the studies indicate that simulation is an effective learning method. One of the challenges, however, has been the issue of transfer of the knowledge from the simulation context to the authentic clinical practice (Gaba 2001, Gaba 2004, Kneebone 2005, Issenberg 2008, Nagle et al 2009). Dr. Roger Kneebone has developed a model that provides a dynamic learning design alternating between the simulation context and the authentic clinical setting in collaboration between clinical and simulation experts. See figure 1. the next page. The model provides an opportunity to link the two contexts in an immediate and direct manner that may overcome the challenges regarding the transfer.

In the current project, we have designed a method for implementing the model that corresponds with our pedagogic philosophy, which comprises of three notions. First, we refer to the notion of experiential learning. Inspired by John Dewey we believe that an individual's learning is dependent upon the person's active action and experience (Dewey 1974 [1938]). Learning occurs when you act and interact with the subject and not only through theoretical studies. The notion "learning by doing" is crucial. The second notion is inspired by the Russian psychologist Lev Vygotsky, who sees the learning process as a relational process embedded in the local context. The "zone of proximal development", where the "more competent other" is essential for the learning process, is a key concept that focuses on the guided learning with experienced clinical educators (Vygotsky 1971 [1934]). At last we are inspired by Lave and Wenger who see learning as

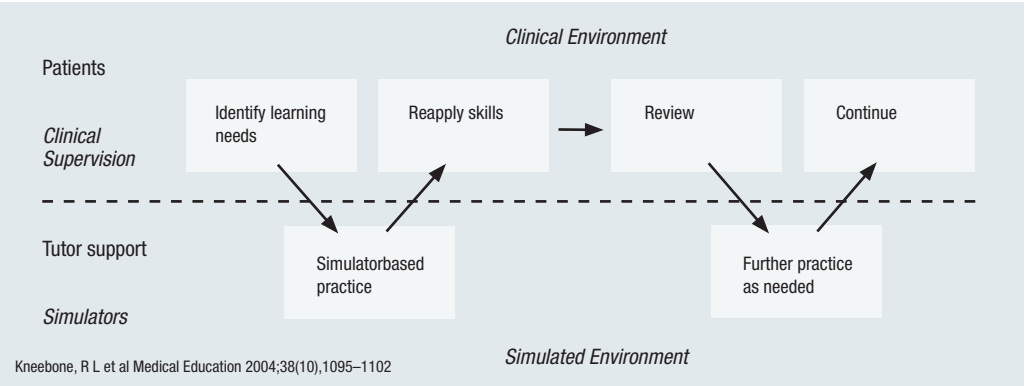


Figure 1. Model by Roger Kneebone, 2004

a continuum of an interpersonal process related to communities of practices. Learning cannot be understood solely through the traditional scholastic methods but is also the result of both conscious and unconscious participation in the social context (Lave & Wenger (2003[1991]).

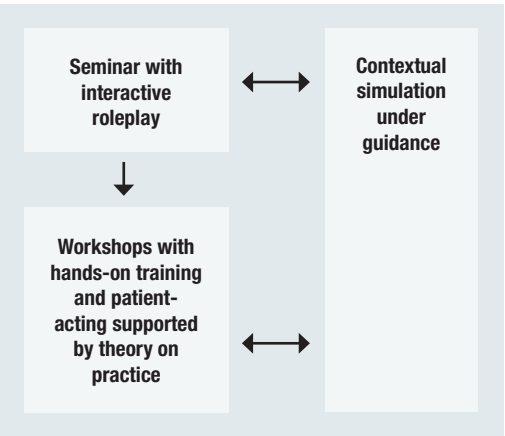
Purpose

The purpose of the study was to design a method for implementing a dynamic and comprehensive model for simulation embedded in the authentic clinical hospital setting in order to improve the quality of the learning environment and the students´ learning out-comes. Our intention was to set out on a road less traveled, where the simulation was low-tech and, happened on-site and the nursing students were in their clinical placements in close collaboration with the clinical educators.

Method

The study had a multi-method approach as it consisted of a mix between seminars with interactive role play, workshops with hands-on training and patient-acting supported by theory on practice and lastly contextual simulation under guidance. Over a one-year period, 34 first-year undergraduate nursing students undertaking clinical placements of ten weeks in internal medicine and neurology were enlisted in the project. Altogether four groups of students participated in the project. It was compulsory for the students to participate as the activities were closely linked with the learning-outcomes in their curricula.

Setting - see figure 1:



Three clinical educators from the involved departments worked closely together with the project leader, developing the simulation sessions and creating an appreciative and safe learning environment.

The project was evaluated in a qualitative, formative design using a triangulation of questionnaires, observations, focus group interviews and portfolios. The formative design enabled continuous adjustment to the clinical context and to the needs of the students.

Seminar with Interactive Roleplay

Forum theatre was carried out as a one-day seminar twice during the project period each time with the participation of 8–10 students and their clinical educator. The seminar was organised during the first two weeks of the students´ clinical

placement. The seminar focused on the patient's perspective, communication training and collaboration with patients.

Two actors from the theatre group were engaged to perform real-life scenarios and involve the participants in acting, dialogue and reflection. Forum theatre is an interactive type of theatre where actors present a problematic situation in a play. When the conflict is at its peak the participants get the chance to voice their opinion and test their ideas themselves, or let the actors perform their ideas. This design allows for a change in perspective and ensures a high degree of participant involvement (www.duet.dk).

The forum theatre facilitated learning through activity, creativity and play. Concepts, such as empathy and confidence were unfolded through role play and exercises. The possibility to participate as simulated patients going through a personal physical experience and being placed in a vulnerable position was essential to the students' ability to grasp the complex needs of the patients.

Scenarios were constructed in collaboration between the actors, the project leader and the clinical educators and presented real-life challenges.

Workshops with Hands-On Training and Patient-Acting Supported by Theory on Practice

Within a ten-week clinical period, four workshops of 2½ hours each were conducted. The learning outcomes were based on the learning outcomes stated in the curriculum for the specific clinical placement. The simulation activities focused on hands-on skills and communicative skills and attention was continuously paid to combining theory and practice by starting each session with a theoretical lesson.

The workshops focused on various topics, such as:

- nutrition and placement of duodenal tubes and feeding tubes
- urinary incontinence, infections and urinary catheterization
- wound care and decubitus
- Chronic Obstructive Pulmonary Disease and oxygen therapy and patient positioning

The simulation sessions were conducted at the ward using the manikin Nursing Anne© and various task trainers. Simulated patients were used in the sessions, for example when training catheterization, during which one student acted the patient and another student performed the catheterization at a task trainer placed in the bed. In this way, communication with the simulated patients was performed alongside hands-on training.

The sessions always involved feedback and reflections and were supported by theory on practice.

Contextual Simulation Under Guidance

In the clinical context, the students were offered the possibility to use the task trainers to practice skills according to their individual needs under the guidance of their clinical educator.

The simulation equipment was mobile, which allowed for contextual simulation sessions to be carried out spontaneously at the ward by the student and her educator. In this way, the students' individual learning needs were identified and addressed and procedures could be trained repeatedly according to the model by Kneebone. The procedures were, amongst others injections, urinary catheterization, the placement of duodenal and feeding tubes, wound care and hygienic procedures.

Measurements

A repeated measures design was employed by the students to evaluate the seminar and the four simulation sessions during their clinical placement.

Questionnaires

Semi-structured questionnaires with open-ended questions were handed out to the students both after the seminar and after all simulations sessions. 130 questionnaires were handed out after the 2 seminars and 13 simulation sessions. The students were asked to evaluate the experience and learning outcomes and to suggest improvements. 82% of the students responded.

Observations

The project leader participated in the seminars and the simulation sessions mainly as "an observer as participant" (Merriam 1992). The observer's activities were known to the group, and the participation was secondary to the gathering of information. On some occasions, the project leader took on an active role as a simulated patient. The observations consisted of two observations of the seminars, one observation of a workshop and eight observations of the simulation sessions.

Focus Group Interviews

During the project period at the end of their clinical placements, the students were invited to participate in a focus group interview carried out by the project leader. The interview was conducted by a semi-structured question guide focusing on identified themes in the completed questionnaires. In this way the students' perspectives could be investigated further. Three formative focus group interviews were conducted with the students.

Portfolio

The students were encouraged to put their experiences and reflections on simulation into writing and share selected documents from the portfolios with the project leader in order to promote self-reflection. Four documents were shared with the project leader.

Data analyses

The answers derived from the questionnaires and the notes from the observations were merged by the project leader into a brief summary. The results from each of the above-mentioned evaluations were used in a formative process during the project, where the clinical educators were given the opportunity to reflect upon and thus adjust the content and the didactic method. The focus group interviews were tape-recorded and sequences that occurred several times, and where the learning outcome was explicated, were transcribed.

By the end of the project, a summative approach was chosen and all the brief summaries and transcriptions were merged into final themes based upon the sequences that occurred several times, the learning outcome was explicated and the students´ most illustrative comments were quoted. The approach of this process of analyzing the data was phenomenological and inspired by Giorgi's method (Giorgi 1985).

Results

Four main themes in the students' learning process are prominent:

- Students gaining self-efficacy
- Transfer of operational skills
- Enhanced understanding of the patients' perspective
- Students gaining communication skills

Students Gaining Self-Efficacy

Several students explicated the educational value of hands-on training and knowledge about the procedures and the practical remedies prior to the real-life interaction with the patient.

> *"So, that I don't stand in there not being in control – I feel more certain. It gives you confidence in the situation that you don't stand there fumbling. It gives confidence in the situation that is important to the patient, who may feel unsafe and frightened when I go in there as a fumbling student."*

The student uses the word confidence, which is related to the term self-efficacy as defined by Bandura (Bandura 1997). Confidence is a more general term whereas self-efficacy can be defined as a person's ability to perform a certain type of task combined with the person's belief in this ability. Bandura's work shows that it can be fruitful to develop a person's self-efficacy as a person with high self-efficacy is more likely to consider a complex situation as something to be mastered rather than avoided. This competence is highly relevant for the health care professions and, as our results indicate, a competence which can be developed through the dynamic simulation model.

Transfer of Operational Skills

"I have had students declining to try out clinical procedures the first times without having seen them performed. After the simulation sessions they jump in the first time. They develop skills faster because of the safe learning environment. They gain more confidence faster."

As the quotation shows, the safe learning environment is crucial to the students' learning process. A safe learning environment in the clinical practice is a complex dimension that is influenced by numerous factors (Ramana & Leinster 2008). Ramana & Leinster argue that the clinical teacher needs to be able to create a positive learning climate in order to set the stage for the future learning and teaching. According to Susan Kilminster, the relation between the supervisor and the supervisee is one of the most crucial factors. She shows that in order to achieve a high quality in the relationship, continuity is necessary, the supervisee needs to have some control over the content and there needs to be reflection by both the supervisor and the supervisee (Kilminster 2007). Our design that is embedded in the clinical practice with supervision from both clinical educators and project leader thus ensured these features of effective supervision and thereby established a safe learning environment.

In the project examples, it emerged that the students were able to conduct operational skills in the clinical setting based on the training during the simulation sessions. The model provides the possibility of training the transfer process in a close relation with clinical educators, who encourage and stimulate the students to perform the skills that they have learned in the simulation sessions. This process requires focusing on the students' ability to not just learn to perform the operational skills but to learn and experience the transferring process – *"you have to learn to use what you have learned"* (Aarkrog 2001).

Another result regarding the transfer was the improvement of the students´ ability to combine theory and practise. As a student stated:"*…it all gives much more meaning when you get the opportunity to combine theory and practice... it was fine to have hands-on training after the theoretical lesson as new questions evolved".*

Enhanced Understanding of the Patients Perspective

"Receiving help to eat by trying to have another person feed you makes it easier to understand how the patient feels, but also because we were reflecting upon the actions afterward." Standardized patients, volunteers or actors have been used successfully in simulation to train communication skills alongside clinical procedures (Kneebone 2002, Decker 2008). We achieved another learning outcome by involving students in patient-acting. The performance brought on what we call bodily learning. By acting the patient, attention was drawn to the students´ own body and resulted in a sensuous expression and tacit knowledge was expressed and reinforced in the acting (Gebauer & Wulf 2001). The emotional content of the learning experience became very obvious when simulation activities involved patient-acting.

Students Gaining Communication Skills

The confidence in carrying out the procedures also seemed to have an impact on the communication with the patient: *"Not having to concentrate that much on this technical aspect gives me capacity to communicate. I have found that I can concentrate more on the communication. The quality of the care improves – I am better at focusing on the communication."*

An additional communication skill was achieved by the students as they gained tools for handling the complex communication situations. During the seminar the participants worked with different patient scenarios: an elderly woman who is breaking the rules of no smoking in the room, and the male patient with aphasia that cannot explain that he needs to go to the bathroom. The scenarios brought out pure feelings, causing the participants to laugh, to be serious and to reflect. The feelings and reactions of the individual participant were addressed, which enabled the participants to deal with and overcome conflict situations. Apparently, being emotionally involved improves the learning experiences - *"the plays were helpful in verbalising and taking action in relation to conceptions like empathy, mutual respect and dilemmas that you may meet in the future".*

Method Discussion

Our purpose with the project was to design a dynamic method that would improve the quality of the learning environment and the students learning outcomes through simulation embedded in the authentic clinical hospital setting. We used low-tech on-site simulation, workshops and forum theatre, and the results of the project show that the students developed both their clinical skills and theoretical knowledge alongside communication skills, self-efficacy and an enhanced focus on the patient's perspective. The dynamic model allowed the clinical educators to engage and interact with their students in a new way that allowed for more comprehensive clinical supervision and knowledge regarding their academic and clinical level of competence. We argue that our model can be used in any clinical setting as it is closely related to the current context, it is low-cost and, under the initial supervision of a project leader, it develops the competences of the clinical educators, thus sustaining the method and improving the learning environment.

We recognize that our pedagogic framework has influenced our choice of methods, study design and evaluation design. In accordance to our framework and our purpose of the study, we chose a qualitative evaluation design with observations, focus group interviews and open-ended questionnaires. We acknowledge that a randomized clinical trial (RCT), in which we could have compared students in our project with students in the more traditional clinical placements, might have validated our results even more. However, we consider the field of learning, training and supervision to be such a complex task that it can be difficult to grasp in an RCT study and we argue that it would have to involve a high number of students from different settings, thus increasing the variables and the biases.

We have asked ourselves if we could have achieved the same results using a more traditional learning lab separated from the clinical setting. Studies show that start up and operational costs of a traditional simulation-based training center require a considerable investment and funding, which can affect the possibility of even considering simulation as a learning method. (Weinstock 2005, Issenberg 2008, Nagel 2009). The mobile setup in our model enables spontaneous training in the clinical setting making it a cheap, easy and accessible learning method. Although, it is obvious that our model also requires organizational support and project leadership and coordination in the starting phase. It may not be as glamorous as an ordinary high-tech simulation and may therefore not be as impressive and motivating for the students, but with dedicated clinical educators, it can be a sustainable learning method.

Conclusion

The scenario-based simulation in a clinical setting gave rise to a creative synthesis between simulation and clinical practice and between theory and practice in addition to improving the learning environment.

Implementing a comprehensive and dynamic model for learning through simulation that is embedded in the clinical hospital setting and carried out in an appreciative and safe learning environment has significantly supported the strategy to improve the quality of the clinical education at the hospital and to improve the novice nurses' competences in the long run.

Improved theoretical and operational skills can potentially reduce adverse incidents and improve patient safety.

Reflections

The process of designing and carrying out a successful simulation session is very similar to staging a theater production (Horn 2007). It requires *"an appropriate venue, a simulation design, a detailed script, clear directions and expectations, actors, props, rehearsals, technical support, feedback, evaluation, and expert time management* (Horn 2007: 61). Using contextualized simulation as a learning method requires an increased effort from all participants compared to the traditional clinical education.

The clinical educators verbally identified their learning outcomes as improved competences in synthesizing theory and practice and improved collaboration with the students.

They stated that participating in the project had improved the collaboration with the other educators and the mutual responsibility of the

group. They have become more attentive to the challenges of making plans for the clinical education. They have become more aware on the distinction between theory *on* practice and theory *for* practice and the status of practical knowledge in its own right.

Future Possibilities

The dynamic process between the clinical environment and the simulation environment and between students and clinical educators can be expanded to encompass both pre- and postgraduate continuing education and thereby fruitfully inspire the different settings. Another area is further competence development for the clinical educators, for example to implement systematic and contextual debriefing methods. At last, we would like to focus on the clinical patient pathway and interprofessional learning and collaboration based upon our results from a concurrent project (Selberg, 2010).

References

Aarkrog, V. (2010) *Fra teori til praksis*, Munksgaard

Ministry of Education, (2008) The evolution of simulation and its contribution to competency, *The Journal of Continuing Education in Nursing*, vol. 39, no. 2.

Decker, S. et al. The evolution of simulation and its contribution to competency. *The Journal of Continuing Education in Nursing*, volume 39, number 2, 2008

Dewey, J (1974 [1938]) *Erfaring og opdragelse,* Copenhagen: Christian Ejlers Forlag.

Gaba, D. M. et al. (2001) Simulation-Based training in anesthesia crisis resource management (ACRM): A decade of experience, *Simulation Gaming*, 32, 175.

Gaba, D, (2004) The future vision of simulation in health care, *Qual. Saf. Health Care*, 13, i2–i10

Gebauer, G. & Wulf, C. .(2001) *Kroppens sprog – Spil, ritualer, gestik*, Copenhagen: Gyldendalske Boghandel.

Giorgi A., ed. (1985) *Phenomenology and Psychological Research,* Pittsburgh, PA, USA: Duquesne University Press.

Horn, M (2007). Practical Suggestions for Implementing Simulations, in Jeffries, P. R. (ed.) *Simulation In Nursing Education*, Copenhagen: Laerdal.

Issenberg, S. B. & Scalese, R. J. (2008) Simulation in health care education, *Perspectives in Biology and Medicine*, vol. 51, no 1: 31–46.

Jensen, T. P. et al. (2008) *Sygeplejerskeuddannelsen- de studerendes vurdering og frafald*, AKF.

Kilminster, S., Cottrell, D., Grant, J. & Jolly, B. (2007) Effective educational and clinical supervision, *AMEE Guide N0. 27, vol. 29, no. 1, January–February*

Kneebone, R. et al. (2004) Simulation and clinical practice: strengthening the relationship, *Medical Education*, 38: 1095–1102.

Kneebone, R. et al. (2005) Evaluating Clinical Simulations for Learning Procedural Skills: A theory-based Approach, *Academic Medicine*, vol. 80, no. 6 / June.

Lave, J. & Wenger, E. (2003) *Situeret Læring,* Copenhagen: Hans Reitzel Forlag.

Nagle, B. M. et al. (2009) Incorporating scenario-based simulation into a hospital nursing education program, *The Journal of Continuing Education in Nursing*, vol. 40, no. 1.

Ramana, S. & Leinster, S. (2008) Teaching in the clinical environment, *AMEE Guide No. 34*, vol. 30, no. 4, May

Selberg, H. (2010) *"Simulation, læring og praksis* – Hvordan styrker vi båndet mellem simulation og praksis", Projektrapport, University Hospital Glostrup

Vygotsky, L. (1976),*Tænkning og sprog*, Hans Reitzels Forlag, Copenhagen

Weinstock, Peter H et al. (2005) Toward a new paradigm in hospital-based pediatric education: The development of an onsite simulator program, *Pediatr Crit Care Med.*

Developing Suitable ICU Scenarios for CRM Training – A Cooperation Project with ICUs and Gjøvik University College

➥ TORE KARLSEN & VIKTOR HAUGOM

Background

It has been pointed out out that medical simulation can support the learning under the right conditions . Both medium- and high-fidelity simulation using patient simulators are effective learning methods when used according to best practice guidelines. Simulation as a learning method gives participants the opportunity to critically reflect on their own and others' activity in the scenario . Several studies highlight the use of simulation in the teaching of problem-solving . It is described as the most appropriate teaching method for increasing the competence to act in ALS (Advanced Life Support) (Hamilton 2005). In other studies, participants perceive that exercising in CRM (Crisis Resource Management) indicates better practice in emergency situations (Kyrkjebø et al. 2006; Rudi et al. 2007). A full-scale simulation teaching method aims to increase intensive care nurses' skills to meet challenges in emergency situations. The advantage of doing this in a simulation setting is according to Lerner et al. (2009), that this can be done in a safe learning environment where it is allowed to make mistakes, and where mistakes do not harm patients. According to Morgan (2006 cited in , simulation also offers a way of bringing together theory and practice and enabling integration.

We base our theoretical framework for using simulation as a teaching method on various learning theories. It is useful to take Knowles' theory of how adult students learn into consideration when full-scale simulation is used as a pedagogic method . In short terms, mature persons take responsibility for their own learning, they prefer discussion, lab exercise and simulation methods to clean lecturers, they value learning that integrates with their everyday life, they have experience which is a great resource for learning and they are interested in the problem centred approach to the subject of learning . Schön's theory about reflection in action and on action is an important theoretical background when debriefing of the scenario takes place. In addition, there is a constructivist approach to learning as referred to by Parker.

The intensive care units (ICU) of three hospitals in the region did a project together with the postgraduate studies in intensive care at Gjøvik University College. The aim of the cooperation project was to develop simulation as a teaching method of intensive care and create a scenario "bank" for use in future education and as a base for simulation training in the ICU.

During the last decade, Gjøvik University College has built a modern simulation laboratory

and increasingly used simulation as a teaching method. The three ICUs had different experiences of using simulation as a method for training skills and problem-solving. Some had used simulation systematically in training and certification in Advanced Life Support (ALS).

From an Idea to Implementation

After the application process, the project group was established with one experienced intensive care nurse from each of the intensive care units and two teachers from the university college.

The staff of the three ICUs were informed at a staff meeting. The head nurses assisted in recruiting five participants from each unit. Students attending postgraduate studies in intensive care were informed and recruited by the teachers. Intensive care nurses conducted a brainstorming session in their unit, where they came up with suggestions for situations that they wanted to simulate. This was important to us based on Knowles' theory on the sources of motivation of adult learners. He claims that adult learners have a problem-centred approach to learning and that they appreciate learning that is relevant to their daily work and can be applied immediately .

The project group used this information as a background for producing four full-scale scenarios based on acute and problematic patient situations:

Scenario 1) Cardiac arrest situation
Scenario 2) Complex intensive patient on a ventilator
Scenario 3) Reception of a trauma patient in the ICU,
Scenario 4) Respiratory problems with the tracheostomised patient

The scenarios were formulated on templates that we used at the simulation centre. It was instructive and challenging to write down all the changes that were likely to happen. Such as the worsening or improvement of the condition, and connect this to the various actions that we expected that participants were likely to do, based on best practices. It was also challenging to plan how quickly the action should have an effect on the simulator in order to make the action seem realistic. This was adjusted interactively based on how the participants solved the tasks in the scenario and partly based on the expertise of the individual teams. It is important to adjust the challenges to the level of competence of the learners, so that they will be challenged, but so that the learning objectives will also be attainable. Otherwise the simulation will not lead to effective learning.

For each scenario we set up one or two learning outcomes. Learning outcomes of the simulation can be different and is important to define in advance. Learning outcomes can be e.g. development of knowledge, skills, confidence, critical thinking, participant satisfaction and role identity.

We sent out information and articles on topics to participants in advance. In this way we prepared them for the intended learning outcomes and the simulation setting. These preparations may improve the learning outcome and reduce stress and anxiety of the participants .

We experienced that the more complex scenarios were, the clearer the formulation of the learning outcomes had to be. It was easier to create a scenario and debrief when there was a proper protocol or there were guidelines to follow than when the learning outcome was to keep order and show leadership for an unstable, complex intensive care patient.

Practical Challenges Pertaining to the Implementation of the Scenarios

To make the simulation as realistic as possible, we arranged the surroundings to resemble an intensive care environment as closely as possible. The simulation centre has medical equipment, emergency rattle, and props, such as makeup, sports equipment and wigs. As we planned and conducted the scenarios, we faced practical challenges which made us adjust or change our plans continually. We discovered methods to reduce time consumption while avoiding mistakes that reduced the quality of the scenario. We made drawings of the manikin with invasive devices, makeup, wound hematoma, tires, etc. and arranged the equipment into boxes accompanying each scenario.

The patient, SimMan®, is an advanced computerised patient simulator. The challenge was to create realistic scenarios. SimMan®'s limitations are partly in the difficulty to visualise change of skin colour and temperature. A sweaty and clammy skin could be simulated by spraying water on the manikin prior to the start of the scenarios. This was perceived as a strong symptom of circulation failure or stress.

Because of the limitations of the manikin, it was difficult to simulate the use and changes in ventilator treatment. The facilitator handled this by "silently" changing the ventilator settings, e.g. so that the alarm indicated increased airway pressure.

Having CRM as one of the learning outcomes, it was important to have enough tasks for the participants during the simulation. This challenged the team to work as a team in order to manage the situation properly. The scenario also had to be dynamic, in order to create new information or clinical signs for the participants to consider. If It was too static for some time, it became harder to "stay in the scenario" mentally.

The static situation made them focus more on the unrealistic parts of the simulation. The participants said that it was more difficult to enter the scenario after a while or to have a peripheral role. They did not immerse themselves in the situation easily. This experience is confirmed by Dieckmann when he says that it is important to agree with the participant of the scenario, that the simulation is a fictive patient-situation, that has the purpose of learning. This requires that some of the unrealistic element of the simulation must be looked upon "as if" they were real. If the participants are unable to keep this "as if" in mind when attending a scenario, they will experience the simulation as unreal and not relevant for their learning. There are many different aspect of the simulation that have influence on each participant's ability to experience the scenario as realistic and relevant.

The operator sat in the control room, adjusted blood pressure, heart rate, respiratory rate etc. and simulated the patient's voice. The role of the operator was important for communicating signals of the development of the condition. It was a challenge some times, to not to make the situation comical and light-hearted by exaggerating. Verbal sounds and phrases had to fit together with the change of the parameters of the monitor etc.

The participants came from three intensive care units with different medical equipment. We considered using known equipment from their respective departments, but decided to use the equipment at the simulation centre. If the participants did not know the equipment, they had to specify what changes they would make, and then they got help from the facilitator. The participants stated that being unfamiliar with the medical equipment was an extra stress factor in an acute situation and that they usually are familiar with the equipment at their unit. Thus, we used more time in the last scenarios to make the participants familiar with the equipment than at the first scenarios we tested. This is an experience that is confirmed by Rall and Dieckmann in their description of the principles of CRM: know your environment and be familiar with the equipment to use as well as the personnel in the team.

Challenges of the Facilitator

A facilitator is the person who directs or "guides" the simulation of different parts. It can involve introducing the simulation, setting the rules for the simulation, participating in the implementation and structuring the debriefing (Jeffries & Rogers 2007).

Preparation

We experienced that the facilitator had to learn the scenario well in advance and think through the possibilities of interpretation and alternative solutions of the scenario. The treatment given must be knowledge-based and in accord with current practice . We had to make a schedule for the briefing, the performance phase and the debriefing. The facilitator and the operator had to plan the handling of "unforeseen" events. Should the facilitator provide tips if the participants had a "blackout" and the scenario stopped, or could the prompts be given through communication via the SimMan?

These are both possible interventions in facilitating the complexity to fit the level of competency of the participants.

When should these kind of hints be given? What actions should be carried out to restore "the energy of the situation" if the scenario becomes too static?

It was important to test communication means between the operator and facilitator, as well as to check that the equipment / tools are in place and in working order. In the beginning we experienced that we had too much equipment present in the scenario environment. We had to remove some of it to make working in this "new unit" easier.

The participants of the project had different experiences with simulation. Most participants were anxious prior to the simulation. They were anxious to demonstrate their skills, but it was exciting to participate "in something new". The experienced intensive care nurses wondered whether they could show their usual skills and knowledge that they knew they have in their common environment.

Team Briefing

Before starting the scenario and preparing the manikin, the participants had a briefing session, in which they received information about the surroundings, the available equipment, how the "patient" can be monitored, medicated and communicated with. The participants underwent a briefing on medical technical equipment and were told that all the actions that they would do in real life, also had to be done in the simulation. The participants stated that the briefing was important for familiarising oneself with the environment and the equipment in order to be able to act properly during the acute parts of the scenario. The participants received also information about the facilitator's role and what kind of help they could expect from him. Retrospectively, the participants said that they noticed immediately if they had not been active enough to familiarise themselves with the environment during the briefing. If they had been to passive, they were unduly stressed when the scenario started. This verifies that all the elements of the simulation are important to achieve learning. The briefing and introduction part is as important as the scenario and the debriefing part, depending on previous experience.

Role Allocation and the Implementation of the Scenario

We carried out ten scenarios in total. The groups consisted of four or five participants, and there were five groups that simulated two scenarios each. The participants gathered outside the simulation room and were assigned roles. The learning outcomes were repeated, so that the participants would remember what to focus on. The participants also had the opportunity to ask questions about any ambiguities. The scenario was read to the participants within or outside the simulation room, whichever was appropriate. The facilitator ended the introduction by saying: "Here you are, the scenario starts now." The facilitator had a peripheral role in some scenarios, such as performing as the lab and X-ray-staff (only available by telephone). If there were any questions concerning problem-solving, it was important that the participants had enough time to think and talk among themselves before they got any hints. This was emphasised especially because the learning outcome was teamwork development. If the participants did not know how to proceed for a long time, they received a tip on how to proceed in the scenario. Eraut states that self-confidence from handling one situation in work is central for a person to seek new challenges. So it was important to make the challenges appropriate for the actual team and the individual. At the same time, the challenges could not be too simple, so that the scenario would not be experienced as boring.

The facilitator used a headset and a microphone to keep the operator informed of the measures and the actions that were made and the medications that were given in order to adjust the haemodynamic parameters properly. The operator observed the scenario but was positioned in a way that prevented him from seeing every detail. If the scenario was about to lose "energy", the facilitator gave a hint to the operator to change the patient's condition. When the learning outcomes seemed to have been reached, the facilitator ended the scenario. The participants were asked how they would have proceeded with further treatment of the patient if the scenario had continued. They were also encouraged to think about three things that they were satisfied with regard to their own efforts. Some participants stated that the verbal communication with the manikin was important to get a realistic impression during the scenario; others focused more on the realistic change of the parameter on the monitor. They appreciated the facilitator's help in relation to unfamiliar equipment along the

way. Some participants regarded the scenarios as too complex without a doctor present. Having the doctor available only by telephone was not sufficient to them. Several participants said that they think more clearly in practice than in the simulation centre. They dread more and changes occur faster in simulation than in real life.

Debriefing

Debriefing is considered "the heart and soul of simulator training" (Dieckmann et al. 2008). The participants were told to do verbal reflection in the debriefing together with the observers. This debriefing part is built upon the idea of Schön's learning theory of reflection .

The purpose is to make discoveries through direct dialogue between the participants to promote learning. Sometimes the facilitator takes a role that resembles more the role of an instructor and contributes content and subject matter into the debriefing when the participants may not have seen, or are not in the position to know something. This can largely be applied to students and participants with little practical experience. Often it is appropriate to have a mix of a facilitator and an instructor in the debriefing. Doerr and Murray point out that no single solution is best for all purposes. We structured debriefing in the introduction, description phase, analysis phase and the application phase as Dieckmann and Rall describe it . Our groups consisted of experienced intensive care nurses and less experienced students of intensive care, but in separate groups. They all had little experience on focusing on the non-technical skills during emergency situations. They had lots of experience concerning teamwork, but they felt that it was rarely reflected upon in a debriefing setting in the clinic.

The video was not used actively during the debriefing. Some participants wanted to see themselves retrospectively and thought that it might be instructive, while others were happy that we did not use the video in the debriefing. Some participants stated that it would have been instructive in particular to see how the communication and management had worked. It was hard to remember everything that happened during the simulation in order to reconstruct it in the debriefing. This argument supports the use of the video in the debriefing . As facilitators we had little experience with using video recordings in the debriefing, and one study suggests that the use of video equipment during simulation is the greatest barrier to attend in simulation . Several participants had high thoughts about how the debriefing was conducted. They preferred to be a small group in the simulation and not with a large group of observers. Some had experience from larger groups during previous simulations. All participants were systematically presented with questions and thought that it was good that the questions were detailed. They were not used to brag about themselves, and found it hard to select three positive things . They were surprised that the debriefing focused so much on the positive aspects. They were surprised that the facilitator instructed them to find successful decisions from situations which the participants themselves considered as failures.

The main focus on CRM and teamwork was unfamiliar to many participants. They expected that the focus would be more on medical care and skills. Nevertheless, focusing on CRM was considered instructive. They had all experienced that the teamwork is important in emergencies. The simulation increased the awareness of the participants regarding the influence of teamwork.

Summary

Our experiences from scenarios 1–10 are useful. We had the opportunity to compare the scenarios that were conducted several times and to observe what created the best learning situations.

The preparation of the participants by stating the theme and the learning outcomes in advance and using a sufficient amount of time for the briefing were perceived as important, which is confirmed by several authors . The participants wanted more reflection and debriefing after problematic situations. Most participants wanted to take part in simulation again and to try different roles. They also wanted their physicians to take part in simulations in the future. We experienced that the learning outcomes can often be too comprehensive, and thereby it becomes difficult to stay focused in the debriefing. Even if the intensive care clinical situations are complex,

we have to define the learning objectives at an appropriate level of difficulty, as claimed by McGaghie et al.

The project group has created a scenario "bank" of the various problematic and acute situations in the intensive care unit that are suitable for simulation. We made a list of various tips that are useful when planning a simulation. We also made an overview of CRM key points as a part of a simulation-binder, which the intensive care units have received.

We can confirm the conclusions of McGaghie et al. that "Simulation –Based medical education is a complex educational intervention that should be introduced thoughtfully and evaluated rigorously at training site". We are looking forward to obtain further experience and to be part of further research in this exciting and effective pedagogic method.

We thank Professor Mary Louise Hall Lord for being the supervisor of the project.

References

Burke, C. S., Salas, E., Wilson-Donnelly, K. & Priest, H. (2004). How to turn a team of experts into an expert medical team: guidance from the aviation and military communities. *Quality and Safety in Health Care*, 13 (suppl 1): i96–i104.

Cant, R. & Cooper, S. (2009). Simulation-based learning in nurse education: systematic review. *Journal of Advanced Nursing*, 66 (1): 3.

Cioffi, J. (2001). Clinical simulations: development and validation. *Nurse Education Today*, 21 (6): 477–486.

DeCarlo, D., Collingridge, D. S., Grant, C. & Ventre, K. M. (2008). Factors Influencing Nurses' Attitudes Toward Simulation-Based Education. *Simulation in Healthcare,* 3 (2): 90–96

Dieckmann, P. & Rall, M. (2008). Becoming A Simulator Instructor And Learning To Facilitate: Evaluation Of The Instructor And Facilitation Training – Infact. In: Kyle, R. & Murray, W. B. (eds.) *Clinical simulation: Operations, Engineering and Management*, pp. 647–652. Oxford: Elsevier Academic Press.

Dieckmann, P., Manser, T., Wehner, T. & Rall, M. (2007). Reality and Fiction Cues in Medical Patient Simulation: An interview Study With Anesthesiologists. *Journal of Cognitive Engineering and Dicision Making,* 1 (2): 148–168.

Dieckmann, P., Reddersen, S., Zieger, J. & Rall, M. (2008). Video-assisted Debriefing in Simulation-based Training of Crisis Resource Management. In: Kyle, R. & Murray, W. B. (eds.) *Clinical Simulation: Operations, Engineering and Management*, pp. 667–671. Oxford: Elsevier Academic Press.

Dieckmann, P. (2009). Simulation settings for acute medical care. In: Dieckmann, P. (ed.) *Using simulations for education, training and research*, pp. 40–138. Lengerich: Pabst.

Doerr, H. & Murray, W. B. (2008). How to Build a Successful Simulation Strategy: The Simulation Learning Pyramid. In: Kyle, R. & Murray, W. B. (eds.) *Clinical Simulation: Operations, Engineering and Management,* pp. 771–785. Oxford: Elsevier Academic Press.

Eraut, M. (2007). Learning from other people in the workplace. *Oxford Review of Education*, 33 (4): 403–422.

Glavin, R. J. (2008). When Simulation should and should not be in the Curriculum. In: Kyle, R. & Murray, W. B. (eds.) *Clinical Simulation: Operations, Engineering and Management*, pp. 71–75. Oxford: Elsevier Academic Press.

Issenberg, S. B., McGaghie, W. C., Petrusa, E. R., Gordon, D. L. & Scalese, R. J. (2005). Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review. *Medical Teacher,* 27 (1): 10–28.

Jeffries, P. (2007). *Simulation in nursing education: from conceptualization to evaluation.* New York: National League for nursing. 168 p.

Jeffries, P. & Rogers, K. (2007). Theoretical framework for simulation designs. In: Jeffries, P. (ed.) *Simulation in nursing education: from conceptualization to evaluation.*, pp. 21–41. New York: Natl League for nursing.

Kaufman, D. M. (2003). Applying educational theory in practice. *British Medical Journal*, 326 (7382): 213.

Knowles, M. (1973). *The adult learner: A neglected species.* Houston: Gulf Publishing.

Laschinger, S., Medves, J., Pulling, C., McGraw, R., Waytuck, B., Harrison, M. & Gambeta, K. (2008). Effectiveness of simulation on health profession students' knowledge, skills, confidence and satisfaction. *Systematic Reviews – Joanna Briggs Institute:* 278.

McGaghie, W. C., Issenberg, S. B., Cohen, E. R., Barsuk, J. H. & Wayne, D. B. (2011). Does Simulation-Based Medical Education With Deliberate Practice Yield Better Results Than Traditional Clinical Education? A Meta-Analytic Comparative *Review of the Evidence. Academic Medicine,* 86 (6): 706–711.

Parker, B. C. M., Florence. (2009). A critical examination of high-fidelity human patient simulation within the context of nursing pedagogy. *Nurse Education Today*, 29 (3): 322–329.

Rall, M. & Dieckmann, P. (2005a, 28 May 2005). *Crisis Resource management to improve patient safety.* European Society of Anaestesiology meeting, Vienna, Austria.

Rall, M. & Dieckmann, P. (2005b). Safety culture and crisis resource management in airway management: General principles to enhance patient safety in critical airway situations. *Best Practice & Research Clinical Anaesthesiology,* 19 (4): 539–557.

Rauen, C. A. (2004). Simulation as a Teaching Strategy for Nursing Education and Orientation in Cardiac Surgery. *Critical Care Nurse,* 24 (3): 46–51.

Ronnestad, M. & Skovholt, T. (1991). En modell for profesjonell utvikling og stagnasjon hos terapeuter og rådgivere./The professional development and stagnation of psychotherapists and counselors. *Tidsskrift for Norsk Psykologforening,* 28 (7): 555–567.

Schön, D. A. (1987). *Educating the reflective practitioner*. San Francisco, Calif.: Jossey-Bass. XVII, 355 p.

Schön, D. A. (1991). *The reflective practitioner: how professionals think in action*. Aldershot: Avebury. X, 374 p.

Patient Safety in Nursing Education in the Czech Republic

➥ MARIE TRESLOVA

When we joined the project of the Rovaniemi University of Applied Sciences called "Enhancing Competence for Patient Safety" we heard about the subject for the first time. After further reflection and discussion, we realised that we of course work with it in education and nursing practice but in a different way than this project probably concerns.

Therefore, we think that there is no exact strategy for nursing competences regarding patient safety in the Czech Republic. While caring about the patients, we work with nursing diagnoses: risk of trauma, impairment, injury, infection, fall and tissue integrity impairment (NANDA International 2010). All these diagnoses are more or less connected with pain perceived by the patient. The diagnoses are risks, and thus, the nurse should have and be aware of the competences that would prevent and help to avoid impairments and to increase patient safety. Nevertheless, handling and moving (the patient), for example, is part of our curriculum, and it is taught on one to two lessons in a course – in comparison with the UK where there is a subject – a course of one to two semesters – in addition to which the nurses have to attend handling and moving courses regularly.

We consider safety not only in the area of physical health and needs, but also in psychic health and needs. The feelings of certainty, confidence, security and safety are very closely joined with the ethical approach of nurses in their role as an advocate. The use of communication skills is crucial in the building of a trustful relation and cooperation between the nurse and the patient. We perceive the autonomy and the decision-making of the patient as very important factors for the patient's feeling of safety. Thus, one of the nursing competences is to give the time and the space for the patient to express her/his needs and ideas.

On the other hand, the nurse has to feel sure about what she/he is doing and why she/he is doing it. This feeling is influenced positively or negatively by the time or the working atmosphere in which she/he is providing the care. An insufficient level of concentration of or fast work by the nurse can lead to the impairment and injury of the patient very easily. The belittling and routine approach of the nurse can invoke the feeling of fear, danger, threat, uncertainty and insecurity in the patient. The gained effective communication skills of the nurse are necessary and useful. For the nursing student to obtain the feeling of safety, the teaching and learning process has to take this into consideration. The teacher has to prepare a safe environment both physically and psychically by using reflective observation and feedback (Billings and Halstead 2009).

The nursing curriculum content of the Bachelor study programme is organised so that the students learn thoroughly all knowledge and skills which are necessary for the administration of the activities of general nurses, who are responsible for general nursing. A sufficient amount of attention is also paid to ensuring patient safety, mainly within theoretical and practical nursing subjects. There are statements, such as "the nurse

has to provide care safely to prevent damage and failure". The question, however, is whether the theoretical statement is effectively implemented in the educational process of nursing education. We feel that it is necessary to improve the teaching skills of nursing teachers regarding patient safety. That is to use a more detailed version of the Experiential Learning Cycle of Kolb (experience, reflection, conceptualization – theory and planning active experiment) (Petty 1996). The consequent use of the 'learning by doing' method described and defined by Dewey or Gibbs (Petty 1996) with reflection and self-reflection plays a very important role in learning.

For nursing education, we acquire equipment, such as aids, mock-ups and manikins, and update them so that the students can train their skills in as actual and real conditions as possible in the skills labs. However, the aids themselves are not as important as the teaching process in which the aids are used. This simulation of nursing skills needs to be debriefed – analyzed, discussed and reflected on. There are various questions to be used in this kind of reflection, as Dieckmann points out (2009). As a result of this kind of process, the student develops and masters proper and safe working procedures and care becomes an automatic, self-evident and natural attitude in both cognitive and psychomotor skills.

The first three weeks of the first-grade practical training are lead by the teachers from the Department of Nursing. The other parts of the training in clinical placements are facilitated by mentors (nurses who are appointed to teach and lead the students). In addition, teachers from the Department come to supervise the students. Mentors do not have any extra time for students. They are mentoring the students among other duties that they have with patients or pertaining to nursing management. The supervisors are more oriented on the reflection of the day, period of time and students' self-evaluation of their progress in achieving planned goals. It is not generally accepted nor understood that supervision is part of practical training. The purpose of the supervision is to stipulate time during the training for reflection on clinical placement or in the lab. The supervisor has to spend an appropriate amount of time for the three steps of the supervision process: 1) experiencing, i.e. retelling a training report so the students experience the training again in details, 2) interpreting, i.e. clarifying and explaining the meaning of a communicative action situation, 3) learning, i.e. creating new insights and integrating them into existing awareness and knowledge (Taylor 2006). In all the mentioned methods and skills, the implementation of learning theories can be noticed (behaviourist, cognitive, social, psychodynamic and humanistic) described by Bastable (2008). She states that it is impossible to say which of the theories should and which of them should not be used. The choice of a theoretical approach is individual and depends on the phase of teaching and learning and on the educational objective.

Our students cannot use themselves as living models, so there are no experiences of role play (as a simulation method) (Petty 1996). We consider role play as very important especially for adopting an ethical, respectful and empathic approach. The didactic methods and approach that we are using lead our students towards critical thinking, self-reflection, empathy and understanding others and themselves through feedback and the analysis of situations. Despite this, we find our teaching activity to be at the beginner's level according to the current "simulation-in- education wave", as manifested in the numerous studies of Mehl, Rall, Wehner, Dieckmann and others. According to their description, simulation in education is a "philosophy" with humanistic, client-oriented (student, patient) and pragmatic principles, which improve safety through quality and cost-efficiency. Decision-making is a crucial skill both for physical and cognitive activities in simulation education. Thompson, McCaughan and Cullum (2007) present their findings of qualitative research in Nurses' Use of Research Information in Clinical Decision Making in high detail and describe reflective practices as a patient-safety tool, which is used by three actors: a nursing student, a novice nurse and a nurse who has erred.

Nowadays, there are nursing standards in every hospital. The contents of the standards of each hospital are based on Czech literature sources and, therefore, on the best practices. There are several regulations and recommendations also due to observing the EU regulations concerning safety

in the use of instruments, devices (mechanical and electric) and other equipment. Criminal acts, especially stealing or the presence of persons who are not members of the health care personnel, are topical. Because of this, there are security guards on the hospital wards, which is new. All of these areas also influence patient safety. When it comes to the best evidence-based nursing practices, there have been very few (if any) studies on simulation and patient safety in the Czech Republic so far. A huge field of research lies ahead.

Keywords: patient safety, nursing diagnosis, communication, skills lab, didactic approach, nursing standards, decision-making

References

Bastable, S. B. 2008. Nurse as Educator: Principles of teaching and learning for nursing practice, 3rd edition, Sadbury, Ma: Jones and Bartlett Publishers, 667 p., ISBN 978-07637-4643-8.

Billings, D. M. and Halstead, J. A. 2005. Teaching in Nursing, Second Edition, St. Louis: Elsevier Saunders, 615 p., ISBN 13: 978-0-7216-0377-3.

Dieckmann, P. 2009. Using Simulations for Education, Training and Research, Lengerich, Germany: Pabst Science Publishers, ISBN 978-3-89967-539-9.

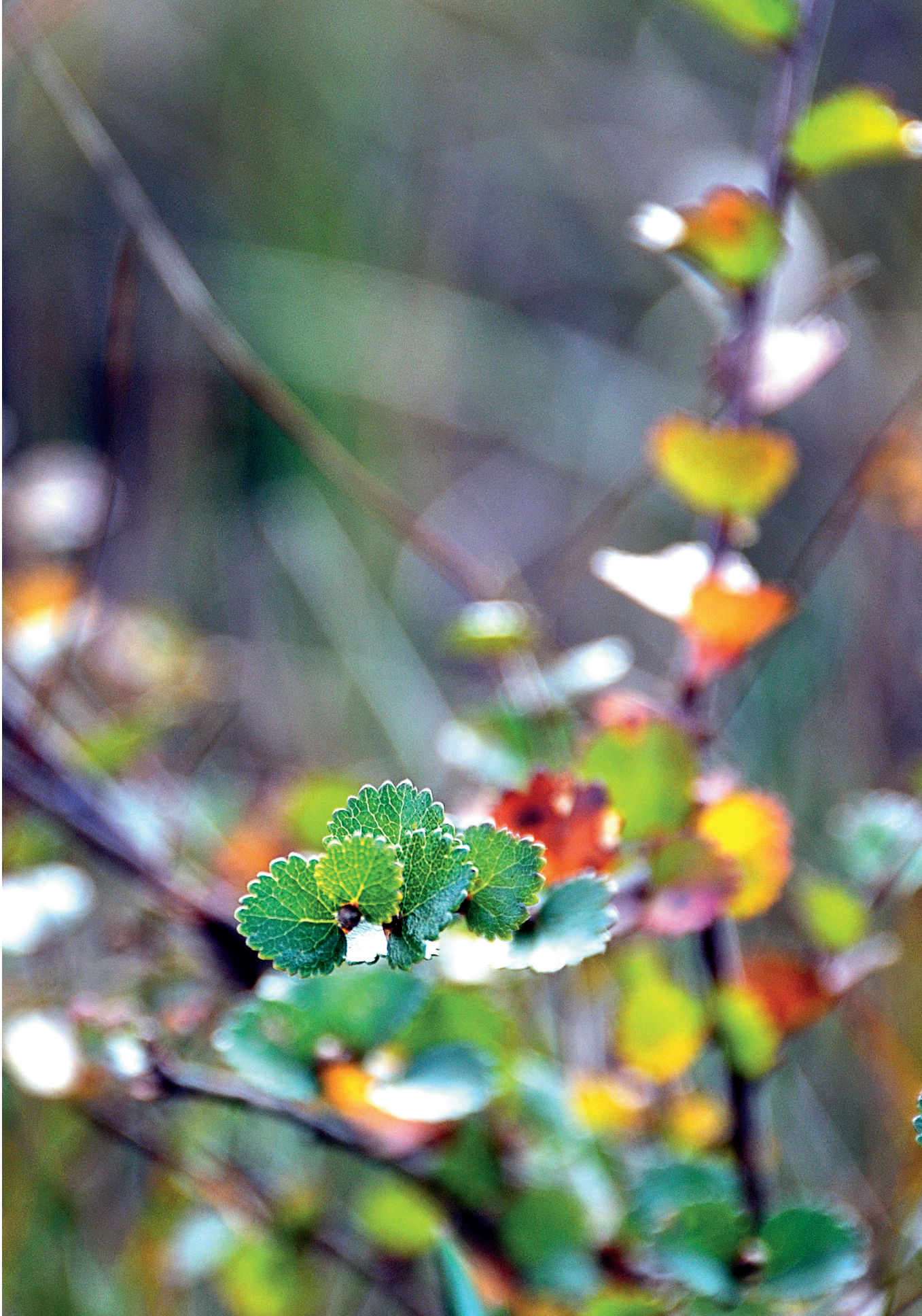
NANDA International. 2010. Nursing Diagnoses, Definition and Classification 2009 – 2010, Blackwell Publishing Limited, ISBN 978-1-4051-8718-3.

Petty, G. 1996. Moderní vyučování, Praha: Portál s.r.o., 380 p., ISBN 80-7178-070-7.

Taylor, B. J. 2006. Reflective Practice: A guide for nurses and midwives, 2nd edition, Maidenhead: Open University Press, 226 p., ISBN 13: 978-0335-21742-7.

Thompson, C., Mccaughan, D. and Cullum, N. 2007. Nurses' Use of Research Information in Clinical Decision Making: A Descriptive and Analytical Study. http://www.york.ac.uk/healthsciences/centers/evidence/recept.pdf.7.10.2008.1991,11,24-29.

The keywords are listed at the end of the abstract.



Virtual Drug Round: Development and Next Steps

➥ PAM MOULE, FIONA BASTOW & LIZ BERRAGAN

Abstract

Internationally, nurses are responsible for the accurate administration of drugs to patients in their care, something that is vital to maintaining the safety and well being of patients. Whilst educational input to drug administration is provided, there remain a high number of errors in medicine calculations and delivery. To address these areas of concern different approaches to the development of knowledge and skills in medicine administration are being explored.

This paper discusses the development and proposed implementation of a virtual drug round (VDR) in a University in the United Kingdom that aims to support the safe administration of medicines. It reflects on the processes of developing the VDR in some detail and considers the implementation plan. Proposals for evaluation are also considered that will inform ongoing development and transferability.

Introduction

Internationally, nurses are responsible for the accurate administration of drugs to patients in their care, something that is vital to maintaining the safety and well being of patients. To promote safe practice student nurses internationally receive education in the calculation and delivery of medicines and are often required to achieve professional competency in such skills (NMC 2010a, Australian Commission on Safety and Quality in Health Care 2009, World Alliance for Patient Safety 2009, Hughes 2008.) Despite educational input and testing, errors in drug administration delivery are recorded and it is felt that a number go un-reported (NPSA 2007, NRLS 2004.) This has led to an exploration of different approaches to educational provision that might enable the development of essential knowledge and skills for safe drug administration practice.

This paper discusses the implementation of a Virtual Drug Round (VDR) that aims to support the development of nurses' knowledge and skills for safe administration of medicines. It considers the relevant international background literature and policy including the importance of safe administration, the development of objective structured clinical examinations (OSCEs) and use of e-learning to support drug administration. Insight is given into the development of the VDR and its planned implementation, before reflecting on the next steps.

Background

Drug administration is a key part of the nurses' role, taking an estimated 40% of nursing time (Audit Commission 2001) and errors in the delivery of medicines are reported as a cause of many adverse care incidents (NPSA 2007 and 2009). Often these errors occur when human factors interact with complex systems for prescribing, dispensing, administering and monitoring drugs. Whilst there is an increasing acceptance that weaknesses within health care systems need review to minimize errors and that the simplification and standardisation of systems can reduce errors (Henriksen et al. 2008), there is still a need to ensure staff have relevant education and understanding to support safe administration of medicines.

The OSCE offers one way for developing vital drug administration skills. Originally developed for the assessment of medical students in Dundee in the 1970s (Harden and Gleeson 1979), it spread beyond medical education to other health care professions including radiology (Marshall and Harris 2000), physiotherapy (Nayer 1993; Wessel et al. 2003), and nursing (McKnight et al. 1987; Ross et al. 1988; Alinier 2003). Contemporary literature suggests that the predominant strategy used to assess competency in skills environments in nurse education is now a modified form of OSCE within a simulated environment. It is suggested that this provides a valid and reliable tool for the assessment of clinical skills within a simulated environment (Nicol and Freeth 1998; Khattab and Rawlings 2001; Alinier, 2003; Major 2005). Conversely, concerns continue to be raised regarding resource implications, the lack of emphasis on holistic care delivery and its limited transferability to practice (Knight 2001; Rust 2001; Redfern et al. 2002; Rushforth 2007). In relation to the teaching, learning and assessment of drug administration, OSCEs and simulation are used in HEIs in relation to patient safety (Paparello et al. 2004), extended nurse prescribing (Franklin 2005) and medication calculations (Hutton et al. 2010). They have also been used as part of online electronically delivered OSCE assessment in radiotherapy (Palarm et al. 2003).

E-learning is used by a number of higher education institutions (HEIs) to support the provision of health care education. A recent survey of 25 HEIs in the United Kingdom (UK) revealed that 100% of institutions were using a virtual learning environment to support student learning. Interestingly, 68% (n=17) were using e-assessment and 60% (n=15) were providing access to multimedia resources such as simulations (Moule et al. 2010). Yet it is suggested that the provision of clinical skills through e-learning has been considered a challenging area and the effectiveness has been difficult to quantify (Gormley et al. 2009). Examples of successful use have included the delivery of resuscitation skills (Moule et al.2008) and of clinical skills to undergraduate medical students, who displayed deep learning traits when using e-learning and performed better in subsequent OSCEs (Gormley et al. 2009). Further evidence from the field of medical education in Sweden also suggests virtual patient simulation used for learning and assessment supports learning (Botezatu et al. 2010a). In fact, Botezatu et al. (2010a) suggested that virtual patient simulation assessment results were consistently superior to those obtained with regular course assessment. Given these positive findings it was felt appropriate to develop a VDR to support student nurses' skills in the safe administration of medicines.

Development of the VDR

The VDR was developed in a University in the south-west of the UK. It is part of a wide e-learning development programme at the University that focuses on the use of virtual simulation to support learning. The VDR focuses on developing safe practice in medicines administration and promoting awareness of safe practice and patient safety issues. Development of this pilot project was supported by a grant from the University e-learning centre and involved a variety of clinical, technical and academic staff with a range of experience. Staff from clinical areas had backgrounds in acute medicine, critical care and surgical nursing as well as pharmacy. The technical staff had a variety of experience in developing a range of e-learning tools. The academic staff included tutors from the pre- and post- registration nursing courses, and all branches of nursing and midwifery were represented. A working party was set up with regular meetings at which staff contributed to the development of the tool. This was especially important to ensure that the scenarios reflected current practice and were realistic (Botezatu et al. 2010b.) A core group of staff then went on to develop the learning objects and scenarios with regular reviews by other team members.

Within the UK undergraduate and diploma education student nurses undertake a three year pre-registration programme. In each year they undertake a variety of theoretical and practice modules, each includes a requirement to attain knowledge and skills essential for registration. In Year 1 nursing students have theoretical and practical skills sessions that explore issues in medications administration, as well as undertaking supervised experience in placement.

From a practical perspective, large numbers of nursing and midwifery students (>750 per year located across three disparate campus sites) dictate that simulation time within the University is limited, restricted by time, space and geography. Virtual simulation is one answer to such pressures on resources (Cook and Triola 2009) and has been shown to have a significant role in many education courses (Ellaway et al. 2009.) Anecdotal feedback from students suggests that they would like more simulation time and do not have consistent opportunities to participate in medication administration in clinical placement due to a number of reasons. The Nursing and Midwifery Council (NMC) standards emphasise the importance of practice in all aspects of medications management and their standards require that students simulate advanced administration techniques such as patient group directives (PGD) (NMC 2010b.) The advantages of the VDR include enabling students to learn at their own pace, practice decision making skills in a safe environment and provide evidence of their learning, for example through assessment (Ellaway et al. 2009; Botezatu et al. 2010b.)

Nursing students have practical assessments, OSCEs in administration of medication and are given step-by-step guidance in preparation for this. This tool is intended to support student learning for OSCEs and practice by enabling students to practise drug administration in a safe simulated environment at their convenience. Students will have an opportunity to follow the published safe practice guidance in preparation for OSCE assessment, based on the latest NMC guidance (2010a) so that they practice the correct procedure for drug administration. It is proposed that students will be introduced to the VDR after doing practical drug administration scenarios is clinical skills sessions. They will access the VDR during the self-directed learning time in the weeks prior to the OSCE, to give them maximum opportunity to practice drug administration skills. They will be encouraged to explore all the scenarios and they will be able to revisit any scenario as many times as they wish. Students can print out a summary of their activity and can record this in their portfolio of achievement. This can also be used as evidence in their practice alongside skills competency documentation.

It is, however, recognised that there are many factors that can influence the likelihood of adverse drug administration incidents, despite nurses following the correct process of medication administration (Hughes 2008; Australian Commission on Safety and Quality in Health Care 2009; NRLS 2004). It would be unrealistic to provide scenarios with no reflection of real life incidents, consequently common difficulties are also explored within the VDR including the most common adverse incidents recorded by the NPSA (2007): interruptions, omissions, incorrect prescriptions and incorrect documentation. The drug round allows the student to make mistakes, which are corrected by the virtual 'mentor' who will give appropriate feedback via the pathway responses. This reflects the experience that students will have when involved in drug rounds, however, the responses will emphasise the implications of incorrect decisions so that students are exposed to the reality of an adverse drug incident. This provides a safe learning environment in which students will not only learn about the correct procedures but also about the complexities of this aspect of nursing care. By following the 'incorrect' decision pathway students can learn about the consequences of their adverse medication incidents and learn to respond appropriately and safely. Students will be able to print out the pathway of decisions they have taken to see where they made correct and incorrect choices so that they can review their progress and important points of learning. As well as using the VDR in isolation, it may be used in peer groups or by facilitators to support ongoing education and maintenance of skills.

Implementation Plans

The VDR will be implemented in phases and currently it is part of the Year 1 nursing programme used to prepare students for their OSCE. This first phase is based on a small service user group in an in-hospital situation, where the highest levels of medication errors are recorded (NPSA 2007.) The tool is designed to allow student access through the internet when they need it, therefore it could be used to revisit administration techniques. Further development of the VDR in years two and three will build in more complex issues of medication

administration in order to further promote safety in drug administration.

As well as practising the correct OSCE procedure, students will be encouraged to follow 'incorrect' pathways as discussed above. As the problems are based on real-life experiences it is hoped that this will enhance their experience and reflect situations that students may encounter in practice. Through the VDR the students should be equipped to deal with real life situations. It is anticipated that students will be able to use their printed off pathway to show progression, which could contribute to formative assessment in the future. This could also be used as evidence of understanding in practice placement assessments.

Evaluation Strategy

As a pilot, the VDR will be evaluated to find out about the student experience and how they perceive it prepares them for their OSCE. Initially an informal evaluation will be solicited to establish general positive views and difficulties, employing an approach used by Paparella et al. (2004). A more formal evaluation is planned to include a questionnaire to all students and focus groups that will allow more in-depth discussion and exploration of student views. It would also be useful to establish if the educational provision has any impact on practice, and there is the potential to measure this through the achievement of OSCEs and to record knowledge attainment through pre- and post-testing as used previously (Moule et al. 2008). Additional data will be collected that records student use of the VDR. University ethics approval will be gained prior to any data collection. The findings will be used to inform further development of the VDR and ongoing use.

Conclusions and Next Steps

It is anticipated that the VDR will be a valuable learning tool that can be developed for use throughout the curriculum. Not only can more complex patient scenarios be explored in the future, but specific needs can be facilitated. An example in development is patient group direction (PGD) which legally student nurses cannot administer. The NMC (2010) essential skills clusters require student nurses to simulate PGD administration. This is where there is an agreed pre-prescribed drug that can be initiated by a nurse based on their assessment of a patient's condition (RCN 2006.) Student nurses need to demonstrate knowledge and use of this skill before qualification. The VDR is an ideal way of allowing students to gain knowledge and understanding of this essential nursing skill. Our evaluation of students and staff experience of the Year 1 VDR will inform any future developments.

References

Alinier, G. (2003) Nursing students' and lecturers' perspectives of objective structured clinical examination incorporating simulation, *Nurse Education Today,* 23, 6, pp. 419–426.

Audit Commission. (2001) A Spoonful of Sugar: Medicines management in NHS hospitals. Audit Commission, London. (accessed online) http://www.audit-commission.gov.uk/health/nationalstudies/other/Pages/aspoonfulofsugar_copy.aspx.

Australian Commission on Safety and Quality in Health Care. (2009) National Medication Safety and Quality Scoping Study Committee Report (accessed online) http://www.health.gov.au/internet/safety/publishing.nsf/Content/com-pubs_NIMC/$File/25185-Report.pdf.

Botezatu, M., Hakan, H., Mesfin, K. T. and Uno, F. (2010a) Virtual patient simulation for learning and assessment: Superior results in comparison with regular course exams, *Medical Teacher*, 32, pp. 845–850.

Botezatu, M., Hult, H. and Fors, U. G. (2010b) Virtual patient simulation: what do students make of it? A focus group study, *BMC Med Educ*, 10: 91. (accessed online) http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3014956/pdf/1472-6920-10-91.pdf.

Cook, D. A. and Triola, M. M. (2009) Virtual patients: a critical literature review and proposed next steps, *Medical Education,* 43, 4, pp. 303–311. (accessed online) http://onlinelibrary.wiley.com.ezproxy.uwe.ac.uk/doi/10.1111/j.1365-2923.2008.03286.x/full.

Ellaway, R. H., Poulton, T., Smothers, V. and Greene, P. (2009) Virtual patients come of age, *Medical Teacher,* 31, 8, pp. 683–684 (accessed online) http://informahealthcare.com.ezproxy.uwe.ac.uk/doi/full/10.1080/01421590903124765.

Franklin, P. (2005) OSCEs as a means of assessment for the practice of nurse prescribing, *Nurse Prescribing*, 3 (1), pp. 14–23.

Gormley, G., Collins, K., Boohan, M., Bickle, I. and Stevenson, M. (2009) Is there a place for e-learning in clinical skills? A survey of undergraduate medical students' experiences and attitudes, *Medical Teacher*, 31, e6–e12.

Harden, R. and Gleeson, F. (1979) Assessment of clinical competence using an objective structured clinical examination, *Medical Education*, 13, 1, pp. 41–54.

Hutton, M., Coben, D., Hall, C., Rowe, D., Sabin, M., Weeks, K. and Woolley, N. (2010) Numeracy for nursing, report of a pilot study to compare the outcomes of two practical simulation tools – An online medication dosage assessment and practical assessment in the style of objective structured clinical examination, *Nurse Education Today*, 30, pp. 608–614.

Henriksen, K., Dayton, E., Keyes, M. A., Carayon, P. and Hughes, R. G. (2008) Understanding Adverse Events: A Human Factors Framework, cited in Hughes, R. G., (Ed.) (2008) *Safety and Quality: An Evidence-Based Handbook for Nurses,* Agency for Healthcare Research and Quality (AHRQ), Rockville (MD), USA. (accessed online) http://www.ahrq.gov/qual/nurseshdbk/.

Khattab, A. D. and Rawlings, B. (2001) Assessing nurse practitioner students using a modified objective structured clinical examination (OSCE), *Nurse Education Today*, 21, pp. 541–550.

Knight, P. T. (2001) A Briefing on Key Concepts – Formative and Summative, Criterion & Norm-Referenced Assessment, LTSN Generic Centre, http://www.heacademy.ac.uk/resources. asp?process=full_records&section=generic&id=7. (accessed 24/01/11).

Major, D. A. (2005) OSCEs – seven years on the bandwagon: the progress of an objective structured clinical evaluation programme, *Nurse Education Today,* 25, 6, pp. 442–454.

Marshall, G. and Harris, P. (2000) A study of the role of an objective structured clinical examination (OSCE) in assessing clinical competence in third year student radiographers, *Radiography*, 6, 2, pp. 117–122.

McKnight, J., Rideout, E., Brown, B., Cileska, D., Patton, D., Rankin, J. and Woodward, C. (1987) The objective structured clinical examination: an alternative approach to assessing student clinical performance, *Journal of Nursing Education*, 26, 1, pp. 39–41.

Moule, P., Ward, R. and Lockyer, L. (2010) Issues with e-learning in nursing and health education in the UK: are new technologies being embraced in the teaching and learning environments?, *Journal of Research in Nursing,* 16 (1), pp. 7–90.

Moule, P., Albarran, J., Bessant, E., Pollock, J. and Brownfield, C. (2008) A comparison of e-learning and classroom delivery of basic life support with automated external defibrillator use: A pilot study, *International Journal of Nursing Practice*, 14, pp. 427–434.

Nayer, M. (1993) An overview of the objective structured clinical examination, *Physiotherapy Canada*, 45, 3, pp. 171–178.

Nichol, M. and Freeth, D. (1998) Assessment of clinical skills: a new approach to an old problem, *Nurse Education Today,* 18, 8, pp. 601–609.

NMC. (2010a) Standards for medicines management, Nursing and Midwifery Council, UK, http://www.nmc-uk.org/Documents/Standards/nmcStandardsForMedicinesManagementBooklet.pdf. (accessed 30/1/11).

NMC. (2010b) Standards for pre-registration nursing education. Annex 3: Essential skills clusters, http://standards.nmc-uk.org/PreRegNursing/statutory/annexe/Pages/Annexe.aspx. (accessed 10/1/2011).

NPSA. (2007) Safety in doses: improving the use of medicines in the NHS, National Patient Safety Agency UK, http://www.nrls.npsa.nhs.uk/resources/patient-safety-topics/medication-safety. (accessed 30/1/11).

NPSA. (2009) Safety in doses: improving the use of medicines in the NHS, National Patient Safety Agency UK, http://www.nrls.npsa.nhs.uk/resources/patient-safety-topics/medication-safety. (accessed 30/1/11).

National Reporting and Learning Service (NRLS). (2004) Seven steps to patient safety: full reference guide, National Patient Safety Agency, (accessed online) http://www.nrls.npsa.nhs.uk/resources/collections/seven-steps-to-patient-safety/?entryid45=59787.

Palarm, T. W., Griffiths, T. M. and Philips, R. (2003) The design, implementation and evaluation of electronic objective structured clinical examinations in diagnostic imaging: an 'action research' strategy, *Journal of Diagnostic Imaging and Radiography,* 5, 1, pp. 1–9.

Paparella, S. F., Mariani, B. A., Layton, K. and Carpenter, A. M. (2004) Patient Safety Simulation; learning about safety never seemed more fun, *Journal for Nurses in Staff Development*, 20, 6, pp. 247–252.

RCN. (2006) Patient Group Directions: Guidance and information for nurses, London: Royal College of Nursing.

Redfern, S., Norman, I., Calman, L., Watson, R. and Murrells, T. (2002) Assessing competence to practise in nursing: a review of the literature, *Research Papers in Education*, 17, 1, pp. 51–77.

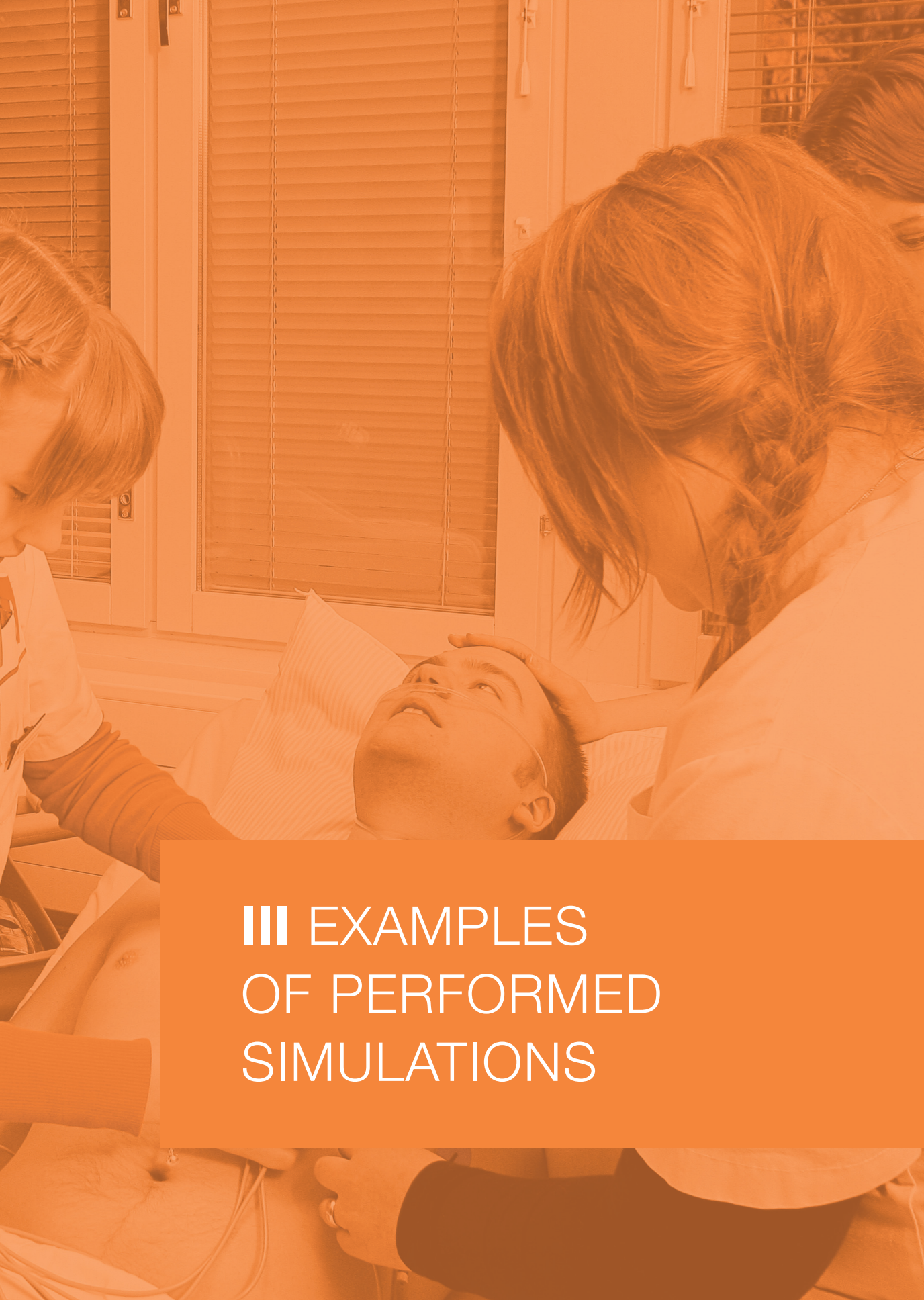
Ross, M., Carroll, G., Knight, J., Chamberlain, M., Fothergill-Bourbonnais, F. and Linton, J. (1988) Using the OSCE to measure clinical skills performance in nursing, *Journal of Advanced Nursing*, 13, 1, pp. 45–56.

Rushforth, H. E. (2007) Objective structured clinical examination (OSCE): review of literature and implications for nurse education, *Nurse Education Today,* 27, 5, pp. 481–490.

Rust, C. (2001) Basic Assessment Issues and Terminology, The Higher Education Academy, http://www.heacademy.ac.uk/resources.asp?process=full_record&section=generic&id=436. (accessed 25/01/11).

Wessel, J., Williams, R., Finch, E. and Gemus, M. (2003) Reliability and validity of an objective structured clinical examination for physical therapy students, *Journal of Allied Health*, 32, 4, pp. 266–269**.**

World Alliance for Patient Safety. (2009) Patient Safety Curriculum Guide for Medical Schools, WHO. (accessed online) http://www.who.int/patientsafety/information_centre/documents/who_ps_curriculum_summary.pdf.



III EXAMPLES OF PERFORMED SIMULATIONS

Developers of Simulation Teaching from the Health Care Sector Gathered to the 'Enhancing Competence for Patient Safety' Seminar

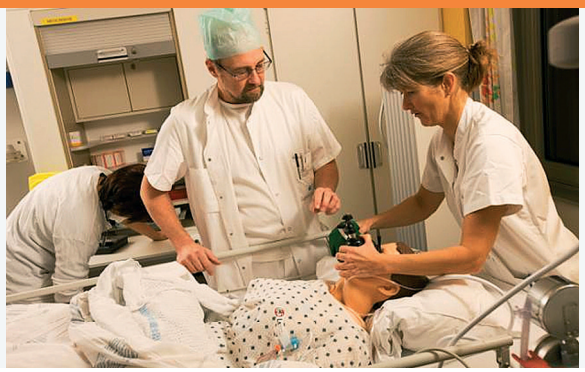
Levi, Lapland, Finland, 13th–15th April 2011.

➥ PAULA POIKELA

Over 110 participants from all over Europe were eager to share practical experience and knowledge on simulation education. All the participants are experts, but I would like to mention a few persons who have been the pioneers of simulation-based health care education: Marcus Rall, Olli Väisänen, Pia Maria Jonsson, Pirjo Pennanen, Jan Keogh, Peter Dieckmann.

Pictures from the Levi seminar (Juha-Pekka Laakso).


Enhancing Competence
for Patient Safety
Levi | Lapland | Finland
Enhancing Competence for Patient Safety
Levi | Lapland | Finland



METROPOL

REGION H Glostrup Hospital

A road Less Travelled

Developing and implementing a dynamic to-and-fro model in undergraduate and postgraduate training in the clinical practice

Design and model

The study comprised of 39 doctors, 50 nurses and 34 first year undergraduate nursing students learning and collaborating on two paths and was evaluated through questionnaires, field observations, focus group interviews and document reviews.

Path number 2 – undergraduate

Over a one year period 34 first year undergraduate nursing students undertaking clinical placements of ten weeks in internal medicine and neurology were enlisted in the project. Altogether four groups of students participated in the project.

Real-life scenarios were embedded in the authentic clinical setting, interactive role-play and hands-on training in addition to sessions with combined theory and simulation. Interactive relationships between clinical experts and educators emerged.

Three clinical educators from the involved departments worked closely together with the project leader developing the simulation sessions and creating an appreciative and safe learning environment.

Results

Four main achievements in the students' learning process are prominent in the results from the project:
- Students gaining self-efficacy
- Transfer of operational skills
- Enhanced understanding of the patients' perspective
- Students gaining communication skills

Path number 1 – postgraduate

39 doctors and 50 nurses and nurse aides from the paediatric ward and the recovery ward participated in simulation in an interprofessional environment in the authentic clinical practice focused on patient safety. In this path the objective was a combination of theory sessions and training clinical procedures combined with full-scale simulation and debriefing. The learning outcomes were numerous and ranged from greater confidence and ability to handle acute critical incidences to enhanced communication and collaborative competences.

A project by:
Hanne Selberg, RN, MEd,Clinical Lecturer,
Metropolitan University College, Copenhagen Denmark
Jette Steenberg Holtzmann, RN, MA, Development Consultant,
& Jette Hovedskov, RN, Development Consultant
Department of Development, Glostrup University Hospital, Denmark

ROVI-ENVI
Rovaniemen ammattikorkeakoulu University of Applied Sciences
Laerdal helping save lives
NATIONAL INSTITUTE FOR HEALTH AND WELFARE
Centre for Economic Development, Transport and the Environment
Leverage from the EU
Valvira National Supervisory Authority for Welfare and Health
European Union European Social Fund

Hochschule Fulda
University of Applied Sciences

Simulation in Nurse Education: The Fulda Case Study

High-Fidelity Simulation in Clinical Nurse Education

Simulation can be:
- Computer steered;
- Skills and task training, or
- Full-scale simulation.

Using nursing scenarios can:
- increase clinical competence, and
- ensure patient safety during the clinical phases of the programme.

High-fidelity simulation of nursing scenarios can improve the quality of clinical teaching in Fulda.

Patient safety should be the most important aspect of clinical teaching.

Simulation provides a safe environment to acquire clinical competencies.

Pedagogical Concept in Fulda

1. Case reconstruction,
2. Critical thinking, while
3. Applying communicating skills,
4. Understanding the student's linguistic skills,
5. Support students in developing questions that will support their learning,
6. Testing their prior learning and knowledge, as well as
7. Challenge them to actively get involved in the case study at hand, and
8. Considering the theoretical grounds contributing to the Patient's current health problem.

The concept is based on Pamela Jeffries' framework.

HOVI-SENTE
Rovaniemen ammattikorkeakoulu University of Applied Sciences
Laerdal helping save lives
NATIONAL INSTITUTE FOR HEALTH AND WELFARE
Centre for Economic Development, Transport and the Environment
Leverage from the EU
Valvira National Supervisory Authority for Welfare and Health
European Union European Social Fund

Gjøvik University College

Simulation Used in Prehospital Care Education

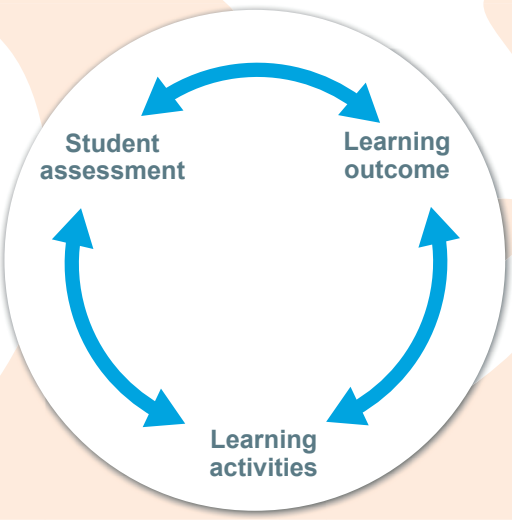
Using simulation in an advanced course in prehospital care for nurse anaesthetists. (15 ECT, 24 weeks – part time)

Learning outcomes

Updated knowledge and clinical competence in:

- Transport and emergency service
- Medical procedures
- Implementation of emergency skills and activities

The education is organised by using simulation in learning activities and student assessment.



Course program

- Emergency medicine
- CPR
- Communication and teamwork
- Ethics
- Safety
- Trauma
- Organisation at the accident scene.

Statements from students

“Simulation gave me useful knowledge and experience and was the most instructive part of the study”

”In simulation training I experienced how important teamwork and communication is in emergency situations”

UC UNIVERSIDAD DE CANTABRIA

Authors: Abajas R, Durá MJ, González S, De la Horra I, López M, Merino F, Quesada A, Torres B, López S.

Clinical Simulation and Learning through Skills in Nursing

OUR EXPERIENCE

Clinical simulation is an effective educational tool, which allows better training in order to develop a whole array of skills. The acquisition of these skills will lead to the achievement of the objectives established in the nursing profile. Clinical simulation offers students the possibility to undertake training practices similar to those performed in different clinical areas.

Our Experience

At the Nursing School of the University of Cantabria, clinical simulation is integrated in the nursing undergraduate curricula at the beginning of the first academic year, when observation, interview, physical examination and patient assessment exercises are performed. During the second academic year, basic techniques and procedures are developed. Finally, during the third academic year, high-fidelity simulation is performed at the Clinical Simulation Center of the University of Cantabria (ASIUC).

FIVE STEPS

Design

Presentation

Development

Debriefing

Evaluation

Case design

Cases are designed by the faculty of ASIUC (six nurses and three physicians). A portfolio with clinical cases has been developed. All of them are structured as follows: student's objectives; personnel and material needed to develop the case; case summary; scenario; expected student performance; and necessary diagnostic tests. Case complexity can vary according to the student's prior knowledge on the subject.

Case presentation

At the beginning of each simulation session, students are presented the case, the patient's information, the scenario and the available resources.

Case development

Two to four students are involved in each case solution.The performance is videotaped and simultaneously viewed by the rest of the students in the debriefing room. Each student has to reflect on screen on his or her comments on technical and non-technical capabilities for further analysis.

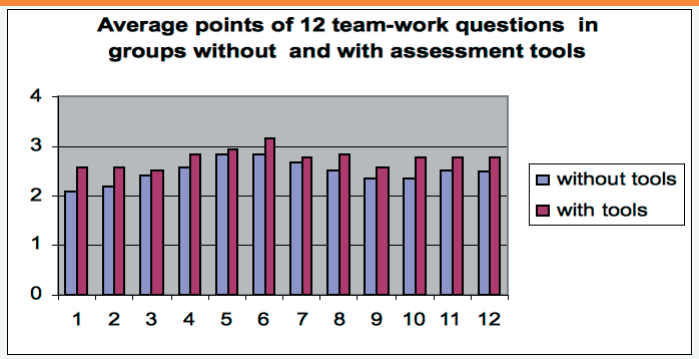
Debriefing

This is the process through which students are able to review their performance after the simulation exercise has been completed. It should be based on the established objectives, the contents of the exercise and on the student's comments and enquires. After the simulation, the instructors should compare the results to the established goals only positively.

Evaluation

Evaluation criteria are those learning objectives that students should fulfil after the simulation. For this, ECOE: Evaluación Clínica Objetiva y Estructurada [Objective and structured clinical evaluation], is the most frequently used technique.

TOVI-EMVI
Rovaniemen ammattikorkeakoulu University of Applied Sciences
Laerdal helping save lives
NATIONAL INSTITUTE FOR HEALTH AND WELFARE
Centre for Economic Development, Transport and the Environment
Leverage from the EU
Valvira National Supervisory Authority for Welfare and Health
European Union European Social Fund



HOSPITAL DISTRICT OF HELSINKI AND UUSIMAA

Tools for Simulation Training and Assessment

Nurmi Elisa 2, Mattila Minna-Maria 2, Silvennoinen Minna 1, Rovamo Liisa 3, Rosenberg Per H 2
1 Department of Computer Science and Information Systems, University of Jyväskylä, Finland, 2 Department of Anaesthesiology and Intensive Care Medicine, University Hospital, Helsinki, Finland, 3 Neonatal Unit, Children's Hospital, University Hospital, Helsinki, Finland

Background

Patient safety requires teamwork.
Reflection of ones own performance is essential for learning.

Three statements

1) Self and peer assessments should be combined with simulator scenario training
2) Debriefing should be supported with the instructors' assessment form
3) Our development schedule aims at promoting the transfer of teamwork skills into health care practitioners' daily clinical practice

Tools

We created educational tools for simulation teamwork training and assessment:

1. workshop prior to scenario training containing a lecture and questions for discussion
2. comparable assessment forms for self and peer assessment
3. ANTS assessment form for the instructor of teamwork assessment and debriefing

Preliminary results

The preliminary results show that the groups that participated in the educational workshop of teamwork and used the evaluation forms expressed better team behaviour right from the beginning of simulated scenarios than the control groups (see Figure 1).

Conclusions

The assessment tools helped participants to direct their attention to learn teamwork skills alongside the technical skills.

The simulation instructor can benefit from the groupwork assessment tool to give debriefing more structure to support the teaching process.

Research process

We used information on prior studies and different training models: CRM, ACRM, NTS, ANTS and TEAM.

References

Flin, R. and Patey, R. BMJ 2009;339:b3595.

Gaba, D. M., Howard, S. K., Fish, K. J., Smith, B. E. and Sowb, Y. A. Simulation Gaming 2001;32:175.

Rall, M. and Dieckmann, P. Curr Anaesth Crit Care 2005;16:273-281.

Kaufman, D. M. and Mann, K. V. (2010) in Swanwick, T. (ed.) Understanding Medical Education: Evidence, Theory and Practice, Oxford, UK: Wiley-Blackwell.

Bose, S., Oliveras, E., and Newcomer, E. W. QA Operations Research Issue Paper, 2001;2;4:1–27.

Fletcher, G., Flin, R., McGeorge, P., Glavin, R., Maran, N. and Patey, R. Br J Anaesth 2003;90:580–588.

Cooper, S., Cant, R., Porter, J., Sellick, K., Somers, G., Kinsman, L. and Nestel, D. Resuscitation 2010;81:446–452.

Rovaniemen ammattikorkeakoulu
University of Applied Sciences
Laerdal
NATIONAL INSTITUTE FOR HEALTH AND WELFARE
Centre for Economic Development, Transport and the Environment
Leverage from the EU
Valvira
National Supervisory Authority for Welfare and Health
European Union
European Social Fund



CENTER OF MEDICAL EXPERTISE
www.tietotaitopaja.fi

Enhancing Patient Safety by Simulation-Based Medical Education

The First Experiences of the Center of Medical Expertise

Rosqvist Eerika, PhD, Antikainen Teuvo, MD, Silvennoinen Minna, M.Ed., Lauritsalo Seppo, MD

Central Finland Health Care District's Center of Medical Expertise provides a modern learning environment with up-to-date equipment and innovative models of education for enhancing clinical competence of health care professionals. Education is provided for most medical specialties. Pedagogically competent clinical teachers, specialists of different specialties, and specialist nurses work as educators. A peaceful learning environment with a wide range of teaching tools, e.g. IT-based simulators, create excellent possibilities for efficient training and learning.

The main aim of the Center is to enhance patient safety by utilizing the newest and ethically approved simulation techniques. However, in order to make most of the equipment simulator training should be connected into curriculums and pedagogical practices.

In 2011, the emphasis of activities is on developing the quality of education. Pedagogical training will be provided for clinical specialist supervisors. Feedback surveys wil be carried out regarding each training program. Some of the new training programs will include research collaboration with the University of Jyväskylä. Follow-up studies are needed to find out the efficacy of simulator training and to what extent and which factors improve the transfer of skills and knowledge from a learning environment to actual clinical work. The Center of Medical Expertise is the only Finnish member in the international simulation network Society for Simulation in Healthcare.

Simulation-based training curriculums in 2011

A Qualified Laparoscopist
- includes training with the LapMentor laparoscopy simulator

The Basics of Gastroenterology + A Qualified Endoscopist
- includes training with the GI Mentor endoscopy simulator

Other compact simulation-based training programs

The Laparoscopy Training Program for Operating Room Nurses
- includes training with the LapMentor laparoscopy simulator

Trauma team training
- with the SimMan Patient Simulator
- designed for multiprofessional teams for practicing team training, leadership, communication skills, desicion making and medical know-how

Emergency Cesarean Section Training
- with the SimMan Patient Simulator

TOVI-EMVI
Rovaniemen ammattikorkeakoulu University of Applied Sciences
Laerdal helping save lives
NATIONAL INSTITUTE FOR HEALTH AND WELFARE
Centre for Economic Development, Transport and the Environment
Leverage from the EU
Valvira National Supervisory Authority for Welfare and Health
European Union European Social Fund

Rovaniemen ammattikorkeakoulu
University of Applied Sciences
LUC

TOVI Use of Simulation Education and Environments in Ensuring Clinical Competence in Patient and Customer Safety

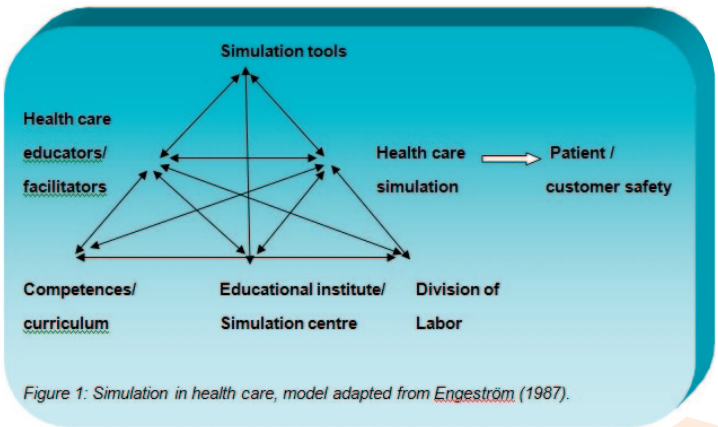


Figure 1: Simulation in health care, model adapted from Engeström (1987).

The objective of this project is to benchmark health care simulation in educational institutes and simulation centres in Europe. The contents of the benchmarking comprises the resources and contents of educational simulation, simulation pedagogy, good practices and future challenges.

Benchmarking interviews were conducted in June 2010–February 2011. The TOVI network assembled in April 2011 to discuss good practices found in the benchmarking interviews and to establish further action. The results of the good practices will be published in December 2011.

Examples of good practices found in the TOVI network

- facilitators have standard instructor training
- standard simulation settings
- scenarios that can be modified for several purposes
- co-operation with the hospital
- utilising clinical experts
- senior students are participating as operators
- standardised patients
- simulation is integrated into the curriculum
- virtual learning materials
- *in situ* simulations
- administration support

TOVI network

- Birmingham City University, the United Kingdom
- Danish Institute for Medical Simulation, Denmark
- Fulda University of Applied Sciences, Germany
- Gøvik University College, Norway
- Hanze University Groningen, the Netherlands
- Malmö University, Sweden
- Metropolitan University College, Denmark
- Rovaniemi University of Applied Sciences, Finland
- Tampere University of Applied Sciences, Finland
- University of Cantabria, Spain
- University of Ostrava, the Czech Republic
- University of South Bohemia, the Czech Republic

Contact persons:
OutiTieranta, RN, MSc (Health Sciences), Senior Lecturer, Rovaniemi University of Applied Sciences, Finland
Paula Poikela, RN, MA, Master of Arts, Senior Lecturer, Rovaniemi University of Applied Sciences, Finland

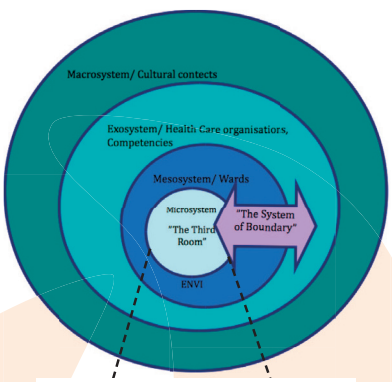
TOVI-ENVI
Rovaniemen ammattikorkeakoulu University of Applied Sciences LUC
Centre for Economic Development, Transport and the Environment
Leverage from the EU
European Union European Social Fund

Rovaniemen ammattikorkeakoulu
University of Applied Sciences
LUC

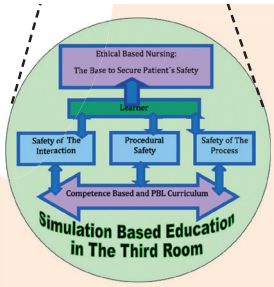
In ”the Third Room”

Patient’s Safety is Secured by Ethical Nursing

Author: Paula Yliniemi



Zone of learning spaces in The Third Room. (cf. Bronfenbrenner, 1979, Seikkula, 1994)



“The Third Room”

A Cultural Environment
Boundary System and a Place of Coupling

- Context
  - Reality by the space and human patient simulator
- Skills
  - Repeating, model learning, training in stages and by guiding
- Evaluation
  - Feedback, correcting errors, critical thinking
- Emotion
  - Feeling of security, motivation and empathy
- Collaboration
- Interaction and processing
- Reflection

Ethical Nursing

1. Safety of Interaction
   - Confidential and open culture in a learning environment
   - Dialogue between staff and patient
     - Given the “expert status” for the client/patient
2. Procedural safety
   - Management of evidence based-practices, health promotion, patient guidance, medical knowledge (Based on: Research/ Current Care Guidelines/ Recognition of growth and development stage/ ICF matrix as a tool)
   - Management of acute, often life-threatening patient situations (identification of the patient’s condition based on symptoms, first aid and consulting)
   - Risk management: prevention of infections and aseptic work practices, prevention of accidents, patient falling and slipping
   - Knowledge of medications and management of medication therapy
   - Management of medical devices and use of wellness technologies
3. Safety of Processes
   - Knowledge of disease-specific and care group-based integrated care pathways
   - Multiprofessional teamwork
   - Recording and communicating (sending) nursing work
   - Privacy protection and information security
   - Quality assurance and research-based working orientation

Rovaniemen ammattikorkeakoulu
University of Applied Sciences
LUC
Centre for Economic Development, Transport and the Environment
Leverage from the EU
European Union
European Social Fund

ENVI – the Virtual Centre of the Wellness Campus

Become a Skilful Professional in the North

In simulation environments, virtual characters and patient simulators act as real patients/clients.

- The scenario can take place at a ski slope, a home or a traffic intersection; Clinical skills are fostered in initial care of the patient by first aid, first response and in reference to primary level and paramedic care. Northern knowledge and skills in health care are practiced in a simulated cold climate indoors.
- The ambulance; One of the facilities for simulated patient care is a fully equipped ambulance. Clinical skills are fostered by mastering distance consultation methods that are used during transportation for the long distances in the North.
- The ER/ICU, internal medicine, the surgical ward, out-patients and rehabilitation environments; Clinical skills are fostered in various hospital and out-patient care environments.

Rovaniemen ammattikorkeakoulu
University of Applied Sciences
Centre for Economic Development, Transport and the Environment
Leverage from the EU
European Union
European Social Fund

SIMULATION OF THE EMERGENCY CAESAREAN SECTION

Practising this rare procedure improves patient safety

Background

Annually, 10–12 babies are delivered in the Central Hospital of Lapland by emergency Caesarean sections. The procedure is rare, acute and unexpected, and its successful performance requires working quickly and communicating effectively across employee groups in accordance with guidelines.

Reasons that lead to dangerous situations are often problems or human errors that occur during treatment.

In the training for delivery-related emergencies, teamwork training is recommended along with clinical skills training. Simulation-based training has been found to be a good method for training for low-incidence situations and patient safety competence.

Objectives

1. Improving performance of emergency Caesarean sections through training
2. Gaining experience on *in situ* simulation performed at a hospital.

Implementation

Five emergency Caesarean section trainings that span the entire chain of events, from the first meeting of the parturient and the midwife to resuscitation of the newborn after the surgery.

Exercise

Simulation-based training for emergency Caesarean sections.

Skills addressed

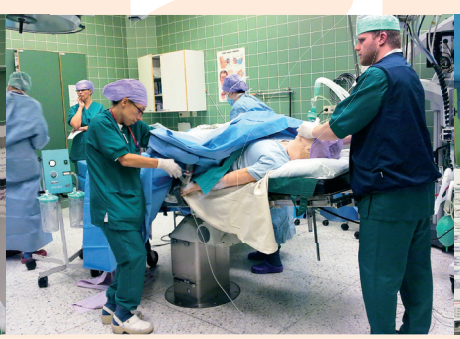
Clinical skills, co-operation, knowledge on the working environment, leadership, interaction, discovering weaknesses.

Simulation

In a simulation exercise, the actual work carried out with the actual target is simulated and the simulation is used for educational purposes.

IN SITU simulation exercises are conducted at places in which actual events take place, in this case in a hospital.

- Merja Lahtela, Paula Poikela -



Rovaniemen ammattikorkeakoulu
University of Applied Sciences

European Union
European Social Fund

LAPIN SAIRAANHOITOPIIRI
LAPPI BUOHCCEDIKŠUNBIIRE

Saimaan ammattikorkeakoulu

Leverage from the EU 2007–2013

European Union
European Regional Development Fund
European Social Fund

The SimLab Project of Saimaa University of Applied Sciences

The SimLab project aims at promoting patient safety in health care.

SimLab - Improve your competencies through simulation

In the project

- a simulation-based educational model is developed with the staff of South Karelia District of Social and Health Services
- teachers of the Saimaa University of Applied Sciences will be trained to be simulation supervisors
- the final seminar of the SimLab project will be organized in the autumn of 2012. More information is found on the project's web site: www.saimia.fi/simlab

TAMPERE UNIVERSITY OF APPLIED SCIENCES

Promoting Patient Safety

by Developing a Learning Environment in TAMK

Tampere University of Applied Sciences. School of Health Care. Ms Seija Tiainen, RN, M.Sc, Senior Lecturer, Nursing, Emergency Care

In order to promote patient safety in nursing education, we have found it very important to **improve students´ clinical skills**. Traditionally there has been very much "learning by doing" in nursing education. Students have practised their technical skills in different kinds of **skills stations**. Non-technical skills (communication, teamwork, leading a team) have not been in such an important role. Today, students practise also them in **simulation environments**.

About two years ago, we started to **improve students´ CPR skills**. **Learning is progressive**: first-year students learn non-professional BLS, second-year students learn professional BLS and the basics of ALS and third- and fourth-year students learn BLS and ALS by simulation. Students can practise their BLS skills and make a test independently in **the Resusci Anne Skills Station**.

In future, our intention is to **develop our learning environment** further. We need different kinds of skills stations and simulation rooms for **low- and high-fidelity simulations**. At first, four teachers have taken the **Simulation Instructor Course**. In the spring 2011, we will have a Simulation Instructor Course for ten teachers.

Together with **the Tampere University Hospital** and **the Medical School of the University of Tampere**, we have founded **the Pirkanmaa Simulation Centre (PIRSKE)** where our nursing students have the possibility to participate in **multiprofessional simulations**.

Tampere University of Applied Sciences (TAMK)

School of Health Care

350 new students a year

- nursing
- public health nursing
- midwifery
- emergency care

PBL as a learning method

Simulation environment 2010

Today it is important to develop curriculum and learning methods, new curriculum in 2013.

TOVI-ENVI
Rovaniemen ammattikorkeakoulu University of Applied Sciences
Laerdal helping save lives
NATIONAL INSTITUTE FOR HEALTH AND WELFARE
Centre for Economic Development, Transport and the Environment
Leverage from the EU
Valvira National Supervisory Authority for Welfare and Health
European Union European Social Fund

The Authors

Bastow, Fiona, Senior Lecturer Adult Nursing, Development of learning and assessment tools, virtual world learning, patient safety University of the West of England.
Fiona2.Bastow@uwe.ac.uk

Berragan, Liz, Senior Lecturer Adult Nursing, University of the West of England, Academic in Practice, doctoral student researching the impact of simulation upon learning for first year undergraduate adult nursing students; other research interests include simulation as a pedagogical approach for learning, and pedagogies for practice learning.
Elizabeth.Berragan@uwe.ac.uk

Bleses, Helma, Professor, Ph.D., Registered Children's Nurse.

Dieckmann, Peter, Dipl.-Psych, PhD, Danish Institute for Medical Simulation (DIMS), Capital Region of Denmark, Herlev Hospital. Working area: Simulation, Train-the-Trainer Concepts, Patient Safety, Human Error, Active Learning Methods, Psychodrama. Research interests: Simulation, Train-the-Trainer Concepts, Patient Safety, Human Error.
mail@peter-dieckmann.de

Haugom, Jon Viktor Tande, RN, Intensive care nurse, CNS, Sykehuset Innlandet Trust, Gjøvik. Working area: Intensive care unit. Research interests: Medicale emergency team.
viktor.haugom@sykehuset-innlandet.no

Herchet, Daniela, B.Sc. (Health Care Management).

Holtzmann, Jette, Development Consultants, Glostrup University Hospital, Capital Region, Denmark, Ndr. Ringvej, 2600 Glostrup.

Hovedskov, Jette, Development Consultants, Glostrup University Hospital, Capital Region, Denmark, Ndr. Ringvej, 2600 Glostrup.

Karlsen, Tore, Senior lecturer, RN, CNS, MSN, Gjøvik University College. Working area: Intensive care nursing. Research interests: simulation as a pedagogic method.
tore.karlsen@hig.no

Keogh, Johannes, Professor, PhD., RN, Fulda University of Applied Sciences, research interest: Primary health care, Nurse education, nursing as a profession.
jan.keogh@pg.hs-fulda.de.

Loewenhardt, Christine, RN, Dipl. Pflege- und Gesundheitswissenschaftlerin,.

Moule, Pam, Professor, PhD, University of the West of England. Working area: Professor of Health Services Research (Service Evaluation). research interests: simulation as an approach to developing skills for practice. Evaluative research. Patient and public involvement in research.
pam.moule@uwe.ac.uk

Poikela, Esa, Professor, PhD, Rovaniemi University of Lapland, working area: professor in educational sciences, research: in adult education, continuing learning, problem-based learning, assessment and evaluation.
esa.poikela@ulapland.fi

Poikela, Paula, Senior lecturer, project manager, MA, RN, Rovaniemi University of Applied Sciences, doctoral student researching simulation pedagogy.
paula.poikela@ramk.fi

Selberg Hanne, Senior lecturer. Metropolitan University College, Copenhagen, Denmark, ,
Acknowledgement of extramural funding – Capital Region of Denmark.
hase@phmetropol.dk

Tieranta Outi, Senior lecturer, MSc (Health Sciences), RN. Rovaniemi University of Applied Sciences.
outi.tieranta@ramk.fi

Trešlová (Treslova) Marie, Senior lecturer PhDr., Ph.D., Working area senior lecturer, Communication in Health Care, Didactics in Nursing, Nursing in Cardiosurgery, Research interests: Communication, University of South Bohemia in Ceske Budejovice, Faculty of Health and Social studies, Department of Nursing.
treslova@zsf.jcu.cz

Paula Yliniemi, Senior lecturer, Med, RN, Rovaniemi University of Applied Sciences, working area: simulation-based and virtual environments OR simulation and virtual environments, psycho- and sociodrama, communication and therapeutic communication in nursing, counselling,
paula.yliniemi@ramk.fi

THE HIGHER EDUCATION INSTITUTIONS OF THE SIMULATION EDUCATION CO-OPERATION NETWORK

- Birmingham City University, **the United Kingdom**
- Danish Institute for Medical Simulation, University of Copenhagen, **Denmark**
- Fulda University of Applied Sciences, **Germany**
- Gjøvik University College, **Norway**
- Hanze University Groningen, **the Netherlands**
- Malmö University, **Sweden**
- Metropolitan University College, **Denmark**
- Rovaniemi University of Applied Sciences, **Finland**
- Tampere University of Applied Sciences, **Finland**
- Umeå University, Department of Nursing, **Sweden**
- University of Cantabria, **Spain**
- University of Ostrava, **the Czech Republic**
- University of South Bohemia, **the Czech Republic**

ISSN 1239-7725
ISBN 978-952-5923-35-3 (bind)
ISBN 978-952-5923-36-0 (PDF)

Rovaniemen ammattikorkeakoulu
University of Applied Sciences
LUC

Centre for Economic Development, Transport and the Environment

Leverage from the EU 2007–2013

European Union
European Social Fund