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ORIGINAL RESEARCH

Finnish graduating nursing students' research utilization competence

Asta Heikkilä*^{1,2}, Maija Hupli¹, Jouko Katajisto³, Helena Leino-Kilpi^{1,4}

¹Department of Nursing Science, University of Turku, Turku, Finland

²School of Health Care and Social Work, Seinäjoki University of Applied Sciences, Seinäjoki, Finland

³Department of Mathematics and Statistics, University of Turku, Turku, Finland

⁴Turku University Hospital, Turku, Finland

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ABSTRACT

In nursing, research utilization (RU) is a core competence for evidence-based practice (EBP). During the past fifteen years, a great deal of effort has been expended worldwide in nursing higher education to promote EBP. This study explores graduating nursing students' RU competence in Finland using a descriptive cross-sectional, long-term survey design with two cohorts of nursing students in 2003 (n = 529) and 2012 (n = 259). Data were collected with a Competence in Research Utilization instrument, and analyzed statistically. In both cohorts, students' attitudes towards RU were positive, but their knowledge and skills were low to moderate. Students' RU competence was higher in 2003 compared to 2012. There is a need to develop nursing education strategically, and by seeking suitable pedagogical methods and curriculum contents to support the learning of RU. In higher education, educational cooperation and longitudinal learning outcome evaluations are recommended.

Key Words: Competence, Higher education, Evidence-based practice, Nursing education, Nursing student, Research utilization

1. INTRODUCTION

1.1 The importance of research utilization in nursing education

In evidence-based practice (EBP), the best research knowledge available, the patients' views, the health care workers' clinical expertise and the organizations' resources are combined into one, seamless whole^[1] for supporting the health and empowerment of populations, and ensuring cost-effective and high quality health services.^[2] The translation of research knowledge into clinical nursing practice, however, is often hampered, primarily due to nurses' lacking readiness for EBP.^[3] The focus in this study is on research utilization (RU), included in and considered as a core of EBP.^[4]

For the past three decades, nursing education has experienced ongoing reforms in Finland and also internationally. The aim behind these reforms has been to improve the level of research based teaching and learning outcomes, and to ensure comparable, compatible and coherent systems of higher education.^[5-8] In Finland, nursing education is a bachelor level education, provided by 22 universities of applied sciences (UAS). In this study, nursing student refers to students undertaking nursing (3.5 years), public health nursing (4 years) or midwifery (4.5 years) degree programs (DP). All DPs lead to a professional registration, and the two latter DPs include a registered nurse degree as well.

Curricula are based the EU Directive^[9] and nine domains of

*Correspondence: Asta Heikkilä; Email: asta.heikkila@seamk.fi; Address: School of Health Care and Social Work, Seinäjoki University of Applied Sciences, FI-60101 Seinäjoki, Finland.

professional competence in nursing, including EBP competence.^[10] The principles of EBP have been emphasized in nurse teacher education at universities as well.^[11] Nursing research has contributed to the expansion of a specific body of nursing knowledge,^[6] and RU is one of the key competences to be achieved during nursing education.^[9,10,12] In Finland, EBP and RU became recognized as an important goal in nursing care and education in the early 2000's,^[13] when research on RU was also started.^[14]

In Finland, the UASs are autonomous as regards curricula, so RU and EBP can be taught as separate courses or integrated into other courses. Until the early 2000's, the curricula of nursing education mainly contained individual, separate research courses, and RU was rarely included in practical training.^[14,15] In addition, the focus of the teaching was more in doing research than in RU.^[16] Since the mid 2000's, following the competence definitions for higher nursing education by the Ministry of Education, the UASs started to set goals for learning RU more extensively and comprehensively across the curricula,^[17] and aspects of EBP have been increased in theoretical and clinical nursing studies.^[18] The competence definitions mentioned above have created objectives and a foundation for nationally unified nursing education.^[17] Various educational actions and teaching methods have been applied to promote RU and EBP,^[4,19] but there is no consensus regarding the most effective teaching strategies.^[20] In this study, the concept competence consists of attitudes, knowledge and skills related to RU. These components are widely used in definitions of competence, and they represent a holistic approach.^[21]

1.2 Relevant literature on the competence in research utilization

In nursing literature, RU is multidimensional and complex phenomenon. It can be seen either as an outcome - as the application of research results in decisions and actions in nursing care - or as a process.^[22] According to Estabrook,^[23] RU consists of three kinds of research use: a) instrumental (IRU, a concrete application of research findings in decisions or delivery of care and treatment), b) conceptual (CRU, which refers to a cognitive process, where research findings enlighten a person's understanding), and c) persuasive or symbolic (PRU, the use of research knowledge to persuade others to change, for instance through policies). It is difficult to identify a clear demarcation between CRU and PRU, whereas IRU is a relatively straightforward concept. In addition, it is suggested that there is connection between CRU and IRU.^[22] Wilkinson^[24] talks of both CRU and PRU as possible precursors of IRU. This study does not distinguish between different kinds of RU, but RU is seen as a whole and

interpreted as a process, which includes the acquisition of research knowledge, critical reading (including evaluation) and the application of research findings.^[25]

RU has been studied worldwide.^[22,26-28] However, research on nurses' and especially undergraduate nursing students' RU competence is quite limited. RU competence has mostly been investigated from the perspective of hindering and promoting factors,^[12,29,30] and as a part of various EBP teaching experiments immediately after the courses.^[31-33] Research focusing solely on the assessment of nursing student's competence^[12,26,34-38] is incomplete.

There is some variation in research results regarding students' RU competence. Nursing students' attitudes towards research are mainly positive.^[34,36,38,39] Students believe that research has a role in developing the nursing profession and that nurses must learn how to access, read, evaluate and utilize research findings in practice.^[35,40] The more positive the nursing students' attitudes,^[14,41] capability beliefs^[12,29,42] and interest^[30] to use research during their studies, the more likely they are to use research in clinical practice after graduation. However, attitudes alone are not sufficient to make changes in clinical practice. Knowledge and skills are equally important.^[43]

Nursing students seem to have limited skills to formulate a question to search for research-based knowledge,^[12] to conduct database searches,^[12,44] and to critically appraise,^[36,45,46] and implement research results.^[37] Students have also been found to consider research daunting and difficult to read and understand.^[35,47]

In Finland, nursing students assessed their knowledge of RU as moderate in the early 2000's,^[14] but knowledge tests revealed their knowledge to be poor or rather poor. The study of Mattila et al.^[48] indicated somewhat better results a decade later. In Sweden, Florin et al.^[12] found that nursing students rated high in capability beliefs regarding EBP skills, but there were differences between universities. According to international studies, nursing students' knowledge and skills of RU have often been found to be low or moderate.^[26,29,49,50]

Some student-related background factors are associated with RU. Female students,^[14,34] students of older age,^[34] and students at an advanced academic level^[28] seem to regard RU more positively. Positive attitudes towards research use and knowledge are positively inter-correlated.^[47,51]

Based on previous studies on this topic it seems that nursing students' attitudes and beliefs about the benefits of RU are mostly positive, but their knowledge and skills in RU seem to be rather low or moderate. Previous literature has mainly

focused on various EBP teaching experiments and on the assessment of students' attitudes, knowledge and/or skills cross-sectionally and immediately after the courses. The studies have often been based on limited sample sizes. There is a lack of longitudinal evaluations of learning outcomes from a wider perspective encompassing attitudes, knowledge and skills in RU.

2. METHODS

2.1 Aim

The aim of this study was to assess Finnish graduating nursing students' RU competence in 2003 and 2012 and to analyze its change during the approximately ten years. The more specific research questions were:

- (1) What kind of attitudes, knowledge and skills did graduating nursing students have regarding RU in 2003 and in 2012, and did any change take place during the period?
- (2) How are the respondents' socio-demographical backgrounds connected with their attitudes, knowledge and skills in RU?

2.2 Design

A descriptive cross-sectional survey design with two cohorts of Finnish graduating nursing students in 2003 and in 2012 was used. The study represents a long-term perspective and the cohort of 2003 was examined retrospectively.

2.3 Sampling

In 2003 (Cohort 1), complete enumeration was used, and data collection was conducted in all Finnish UASs offering nursing degree programs in Finnish. All graduating full-time (N = 1,051) nursing students were invited to participate in the study.

Based on a power analysis (a Chi-square test; statistical level of significance 0.05, strength 90% and effect size 0.1), the required number of observations (sample size) was 192, and it was possible to obtain a sample for Cohort 2 in 2012. For the Cohort 2, three UASs were chosen from five university hospital district cities through random sampling as part of a larger research project. At each of the three UASs, all graduating full-time nursing students were invited (N = 369) to participate.

2.4 Instrumentation

Data were collected using the Competence in Research Utilization (CompRU) questionnaire developed in Finland 2001-2003^[25] for this purpose, because no suitable instrument was available at the time. The categories and items in the CompRU instrument were based on a literature review and a

nation-wide thematic enquiry for UASs principal lecturers (n = 37). The enquiry had involved open-ended questions on nursing students' desirable research utilization qualifications, which had been analyzed using content analysis. A few variables and reply instructions were reformulated in 2012 for clarity to strengthen the conceptual validity of the instrument.

The CompRU instrument was developed approximately 15 years ago,^[25] and it has been used in Finland. The content and concepts of the instrument are still relevant in the higher nursing education in UASs in Finland^[10] and in international measurements^[52] as well. The CompRU instrument consists of 63 items divided into three sections: Attitudes to RU (16 variables), Knowledge related to RU (31 variables) and Skills related to RU (16 variables). Students self-assessed their attitudes and skills using a five-point Likert scale. Their knowledge was assessed by a knowledge test including four multiple-choice questions and 27 other assignments. The knowledge test was scored by allocating one point for each correct answer (max. 31 points).

2.5 Data collection

The data collection procedure was identical for the two cohorts and it was conducted in the students' last semester prior to their graduation. Contact persons in UASs forwarded a covering letter and a link to an electronic questionnaire to the participants by email. Students responded the questionnaire during a class.

2.6 Ethical considerations

Ethical principles were followed at all the stages^[53] and ethical approval was received prior to study implementation. Permission for the study was received according to the practices and instructions of each participating institution. On the first page of the electronic questionnaire, the participants were asked for their informed consent. Participation was voluntary and anonymous, and individual students could not be identified from the data.

2.7 Data analysis

Data analysis was conducted using SPSS Version 22.0 software. Twenty sum variables were formed based on the theoretically defined sections, categories and sub-categories of the CompRU instrument. Differences in background variables between cohorts were tested with Independent Samples *t*-tests or Chi Square tests. The effect of all background variables on both cohorts was examined using Multifactor Analysis of Variance. Finally, the cohorts were compared using Multifactor Analysis of Variance to control this comparison with all background variables. The observed significance levels of < .05 were considered to be statistically significant.

3. RESULTS

3.1 Participants

There was a total of 526 (response rate 50%) graduating nursing students in Cohort 1 (C1), and 259 students (70%) in Cohort 2 (C2). In the following, the results will be presented as above, for the two cohorts respectively. The mean age was almost the same in both cohorts (mean 25.5 and 25.9 years/standard deviation 5.7 and 5.1 years/range 21-51 and 22-54 years). Most of the students were female (94% and 97%). Of the students, 75% and 91% had general upper secondary education and 66% and 19% had a prior vocational qualification in health care. Most of the students (82% and 88%) had some experience of working in health care (mean 1.4 and 1.8 years). Statistically significant differences were observed between the cohorts concerning general education (middle school/junior high school $p < .001$), prior vocational qualification in health care ($p < .001$) and the amount of working experience in health care ($p < .001$).

3.2 Nursing students' competence in research utilization

3.2.1 Attitudes to research utilization

The students' attitudes to RU were rather positive in both cohorts. The attitudes were more positive in C1 (2003) than in C2 (2012), although not statistically significantly in all categories. In both cohorts, the appreciation was higher than the commitment to RU (see Table 1).

3.2.2 Knowledge related to research utilization

In both cohorts, less than half of the students knew the correct answers to the questions and assignments, but the number of students with the correct answers was higher in C1 than in C2 ($p = .008$). In the category "Acquisition of research knowledge" there were no differences between the cohorts. In C1, more students knew the correct answers concerning the "Process of producing research" ($p < .001$). In both cohorts, over half of the respondents knew the "Evaluation criteria for research" (see Table 2).

Table 1. Graduating nursing students' self-reported attitudes and skills in research utilization

Sections Categories (I-II and I-III)	Cohort 1 (2003) (n = 526)		Cohort 2 (2012) (n = 259)		Comparisons of the cohorts [#]		
	Mean	SE	Mean	SE	p-value	df	95% CI for difference
Attitudes to research utilization[†]	3.71	0.05	3.52	0.05	< .001*	1	0.12, 0.26
I Appreciation of research utilization	4.16	0.05	4.15	0.06	.672	1	-0.06, 0.09
II Commitment to research utilization	3.26	0.06	2.88	0.06	< .001*	1	0.30, 0.48
Skills related to research utilization[‡]	3.51	0.05	3.45	0.05	.087	1	-0.01, 0.14
I Acquisition of research knowledge	3.64	0.06	3.55	0.07	.045*	1	0.00, 0.19
II Critical reading of research	3.40	0.06	3.37	0.06	.445	1	-0.05, 0.12
III Application of research	3.61	0.06	3.51	0.07	.025*	1	0.01, 0.19

Note. SE = Standard Error; [#] = Multifactor Analysis of Variance; * $p < .05$; [†] 5-point Likert scale (1 = disagree completely, 2 = disagree partially, 3 = neither agree or disagree, 4 = agree partially, 5 = agree completely); [‡] 5-point Likert scale (1 = very poorly, 2 = rather poorly, 3 = neither well nor poorly [moderately], 4 = rather well, 5 = very well).

Table 2. Knowledge related to research utilization by graduating nursing students

Section Categories (I-III) Sub-categories	Cohort 1 (2003) (n = 526)		Cohort 2 (2012) (n = 259)		Comparisons of the cohorts [#]		
	Correct answers		Correct answers		p-value	df	95% CI for difference
	%	SE	%	SE			
Knowledge related to research utilization[†]	45.50	1.94	41.61	2.08	.008*	1	1.03, 6.76
I The acquisition of research knowledge	30.27	2.97	33.74	3.18	.120	1	-7.85, 0.91
Information sources	16.02	3.55	26.79	3.80	< .001*	1	-15.99, -5.53
Methods of information acquisition	44.51	4.14	40.69	4.43	.219	1	-2.28, 9.93
II The process of producing research	46.86	2.14	41.30	2.30	< .001*	1	2.40, 8.73
Structure of research articles	76.47	2.77	70.74	2.96	.006*	1	1.64, 9.81
Research terminology	33.76	3.04	31.52	3.26	.326	1	-2.24, 6.73
Research approaches	40.58	3.82	28.13	4.09	< .001*	1	6.82, 18.09
Data collection methods	64.05	3.81	53.57	4.09	< .001*	1	4.85, 16.11
Data analysis methods	37.56	3.16	33.92	3.34	.126	1	-1.02, 8.31
III The evaluation criteria for research	52.96	3.35	51.30	3.59	.508	1	-3.28, 6.62
Reliability	51.09	3.67	50.32	3.95	.782	1	-4.68, 6.21
Clinical relevance	58.57	5.48	54.19	5.87	.288	1	-3.70, 12.47

[#] = Multifactorial Analysis of Variance; SE = Standard Error; * $p < .05$; [†] Knowledge Test including multiple-choice questions and assignments (scoring: one point for a right answer).

3.2.3 Skills related to Research Utilization

The students' skills in RU were slightly above moderate in both cohorts. The tendency was that the students in C1 assessed their skills as higher than the students in C2, but not statistically significantly in all categories. The students in C1 assessed their skills as higher in the categories "Acquisition of research knowledge" ($p = .045$) and "Application of research" ($p = .025$) (see Table 1).

3.2.4 Connection between background variables and research utilization

In both cohorts, the attitudes to RU were more positive in students of older age (C1: $p < .001$ and C2: $p = .001$). In addition, respondents with general upper secondary education (C1: $p < .001$ and C2: $p < .001$) obtained higher knowledge test scores. Apart from this, no clear or systematic associations were identified between the background variables and RU competence.

4. DISCUSSION

4.1 Main results

The aim of this study was to assess Finnish graduating nursing students' RU competence in 2003 and 2012 and to analyze its change during the approximately ten years. The results do not indicate change in graduating nursing students' RU attitudes, knowledge or skills during the approximately ten-year period. An encouraging result is that the students' attitudes were mainly positive in both cohorts, as also seen in other studies.^[38] The results also indicate that the students in both cohorts appreciated RU more than they were ready to commit themselves. One reason for this could be that students find research daunting and difficult, as revealed in the study of Brooke et al.^[35] It is therefore important that researchers and educators make an effort to develop and share good practices for education and clinical practice to render research more accessible and to present it in a user-friendly form and language. Curtis et al. (2017) suggest that researchers should consider the translation of research into clinical practice in research design, including the end users and an evaluation of the research implementation.^[54] During the clinical practical training, students could benefit from an experienced RU facilitator or mentor, for the facilitation has been identified as an important contributor to successful research implementation.^[55]

The students' knowledge related to RU remained at a low level in both cohorts; students knew the correct answer to approximately half of the questions asked. This result is similar to the findings in Elomaa's^[14] study. International studies have also often reported low or moderate levels of RU knowledge among nursing students.^[49] In addition, students' better knowledge in 2003 compared to 2012 cannot

be considered a positive result. The results do, however, indicate that a positive change occurred in students' familiarity with information sources. This can be inferred to be a consequence of increased emphasis on research literature searching, often carried out in co-operation with librarians. The increased availability of various electronic databases in UASs and health care organizations might be another explanation.

The results show that in 2012, students' knowledge of how research is produced and which criteria can be applied to evaluate it, was even lower than in 2003. This is worrying, and it seems that despite the many efforts undertaken in higher nursing education in Finland since the mid 2000's, the most appropriate strategy, methods and solutions for teaching RU have not been discovered yet. Thus, seeking successful pedagogical solutions calls for common effort. In this study, general upper secondary education was associated with knowledge in both cohorts. The result indicates that the more evaluative processing of theoretical contents adopted during general upper secondary education supports the learning of RU in nursing education. Thus, it is important in nursing education and clinical practice to strengthen learning opportunities that promote critical thinking. Also Wangesteen et al.^[39] pointed out that critical thinking is a significant predictor for attitude towards research and the use of research.

The students' self-reported RU skills were moderate - also Elomaa^[14] - in both cohorts, although slightly better in 2003. It can be assumed, however, that not having been based on sound theoretical knowledge, the students' skills may not have been moderate or good in reality. The difference in the results between the self-assessment and knowledge test may be due to students' overestimation of their skills. In addition, at the point of graduation, students might not yet know what they need to know in order to be rated as competent.^[21] Therefore, in the future, it would be important to implement a more multidimensional, longitudinal, and comparative learning outcomes assessment for RU competence. A more dependable view could be gained by including the perspectives of nurse teachers, students' clinical supervisors, nurse teacher educators at universities, and even healthcare clients.

As a summary, during the past fifteen years there has been in Finland a strong emphasis in the higher education to promote the learning RU.^[10,14] The results of this study, however, based on graduating students' self-assessment and a knowledge test, do not indicate any clear, positive change in learning outcomes related to RU during the approximately ten year-period. Other recent international studies also confirm

that the expected level of students' ability to use research knowledge is not identifiable.^[35,46,56]

Institutions educating nursing professionals have a significant role in promoting EBP in health care. The results show that there is clearly a need to change strategy to promote learning of RU by developing pedagogical methods, curriculum contents and assessment in nursing education. In Finland, nationwide new professional competence requirements have recently been defined for nurses,^[10] including 30 credits of evidence based practice and decision making studies. It is essential that the UASs will base their curricula on these definitions to achieve an increasingly unified and effective education in RU. In addition, teaching RU and EBP should be even more closely incorporated into all courses and clinical training of students. Therefore, even stronger cooperation between educational institutes and clinical training sites is necessary to reach a common understanding of the goals and methods of supporting learning RU.

The results of this study are meaningful insofar as they represent an initial attempt within nursing education to undertake a longitudinal study of graduating students' RU competence. In nursing research, most of the studies in the educational field have been cross-sectional, and no common trends are identifiable. The value of this study also lies in its aim to assess nursing students' RU competence from a wider perspective of attitudes, knowledge and skills, and from the viewpoint of learning outcomes at graduation, just prior to entering the profession. However, more research is needed. It would be essential to assess the RU competence of Finnish graduating nursing students again in the years 2021-2022 to acquire more specific comparative evidence about the change of their RU competence at still a longer period, and after the implementation of the nationwide new professional competence requirements. Longitudinal research is needed to understand critical points of the development of RU competence during the nurse education.^[21]

4.2 Limitations

There are limitations concerning the validity and reliability of the study. First, sample representativeness has to be considered. In both cohorts, the nursing students were graduating, so in this respect the cohorts are comparable. However, the sample in Cohort 1 was larger, including UASs in both university hospital districts and other parts of the country, whereas the sample in Cohort 2, based on a power analysis, only covered university hospital districts. University hospitals collaborate closely with UASs in promoting EBP, and they are also important clinical training placements for nursing students. The response rate was higher (70%) in Cohort 2 than in Cohort 1 (50%). This means that in Cohort 2, the

sample may be more representative at university hospital districts. The results cannot be generalized, but they give reason to be concerned; it could be assumed that the presence of university hospitals could influence students' RU competences. Considering the above limitations, all background variables were controlled in statistical comparisons of the two years, so that the results of the cohorts became comparable.

Second, we need to consider the data collection instrument, CompRU. It is a questionnaire aimed to measure competence in RU. Some dimensions of RU competence, especially attitudes,^[57] have usually been examined as part of other studies. Only few tools have been recently developed specially for assessing students' EBP competence.^[32,58] Thus, the CompRU instrument was developed to measure RU competence extensively (attitudes, knowledge and skills). The instrument was developed based on nursing research knowledge for the context of higher nursing education. The content validity of the CompRU instrument had been evaluated as possessing face validity in 2003 (n = 29),^[25] and tested again in 2012 by experts and students in nursing education, nurse teacher education and clinical practice (n = 6). Cronbach's α -coefficient, used to test the consistency of the instrument, gave satisfactory values (0.80-0.87 in Cohort 1 and 0.78-0.88 in Cohort 2) for all three sections.^[59] Although the CompRU instrument had face validity and satisfactory internal consistency, the psychometric aspect of the CompRU instrument should be further tested, especially for international use.

Thirdly, we need to consider students' self-assessment, largely used in educational evaluation. Self-assessment is subjective, and self-rated nursing competence often ranges from moderate to good.^[21] It is important that alongside self-assessment, there are more objective measures to assess RU competence.^[60] In this study, both self-assessment and a knowledge test were used, and it was possible to form a more comprehensive view of students' competence. However, a more wide-ranging and objective assessment of learning outcomes in RU is recommended.

5. CONCLUSIONS

During the approximately ten year-period, there has been no change in Finnish graduating nursing students' RU competence. The results of this and earlier research indicate that despite all the efforts and resources dedicated to promoting EBP, learning RU continues to be a common challenge worldwide, and nursing students' RU competence seems insufficient just prior to entering the profession. There is a necessity to develop strategy, pedagogical methods, curriculum contents and assessment in nursing education. It is recommended that models for joint planning, implementation, monitoring, and assessment of RU teaching in nursing

education should be developed and disseminated internationally, also in the fields of continuing education, professional development and teacher education. Robust leadership, governance and accountability of nurse leaders are also essential

when planning and managing capacity building of nursing professionals representing different levels of expertise.

CONFLICTS OF INTEREST DISCLOSURE

The authors declare that there is no conflict of interest.

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