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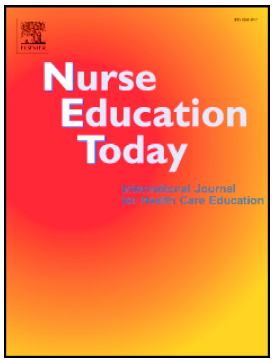

Development and testing of an instrument (HeSoEduCo) for health and social care educators' competence in professional education

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Abstract

Background: Health and social care education is highly important for preparing future professionals for their future roles in sustainable health and social care. However, previous studies have emphasized that health and social care educators' competence is complex and poorly defined. Thus, there is a clear need for a psychometrically validated instrument to enable clarification and assessment of the required skills.

Objective: To develop and psychometrically validate an instrument (the HeSoEduCo) for assessing health and social care educators' competence in higher and professional education.

Design: Cross-sectional study.

Methods: A HeSoEduCo instrument, with items inviting 1-4 Likert scale responses, was developed, based on one systematic review and one qualitative study, then validated in terms of face, content and construct validity and internal consistency (Cronbach's alpha values). All health and social care educators based in all 21 universities of applied sciences in Finland and seven vocational colleges were subsequently invited to participate in a large-scale application of the instrument in fall 2018. In total, responses of 390 of these educators are analyzed here.

Results: The face and content validity of 71 newly developed items were assessed by experts in two evaluation rounds. The final content validity showed high scores for the instrument's relevance and clarity. Confirmatory factor analysis (to test construct validity) yielded eight factors (43-items remaining), defining the following competence areas of educators: evidence-based practice, digital collaborative learning, student-centered pedagogy, collaboration & societal, leadership & management, cultural & linguistic diversity, mentoring student into professional competence development and subject & curriculum. Cronbach's alpha values for the factors ranged from 0.70 to 0.89.

Conclusion: The instrument can be used to obtain self-evaluations of educators' competence when assessing their general competence levels and help human resources departments and managers to identify suitable continuous education programs for their staff.

Keywords: Health care, social care, instrument development, statistical testing, competence, educator

Highlights

An instrument for assessing health and social care educators' competence (the HeSoEduCo) was developed.

The instrument was psychometrically tested with content and construct validity and reliability.

The instrument can be used for self-evaluation of educators' competence in eight areas including evidence-based practice, digital collaborative learning, student-centered pedagogy, collaboration & societal, leadership & management, cultural & linguistic diversity, mentoring student into professional competence development and subject & curriculum.

It can provide useful information for development of programs to boost this competence, both during and after educators' graduation.

Introduction

Globally, there are high and rising shortages of health care workers. According to the World Health Organization (WHO), there was a shortfall of about 2.7 million in 2013, and this figure was predicted to rise to 12.9 million by 2035 (WHO, 2013). The cited report included stark warnings about difficulties in retaining an ageing health care population, workers taking other jobs, and failure to recruit and keep young people in the sector. At the same time there are growing needs for social care to support primary health care, especially for the elderly (Soares et al., 2018), as well as clients with chronic disease and/or critical social situations (Chapman et al., 2018). High turnover intentions were identified in the decreased interest of new health care workers to keep their demanding work. Job satisfaction and wellbeing, especially concerning nursing professions, had a high correlation with turnover intentions. (Roelen et al., 2013). Thus, appropriate education is highly important for preparing future professionals for their future roles in sustainable health and social care, promoting the sector, and retaining workers. To meet these needs, the education of future professionals in the sector requires reformation, innovative solutions and strategic vision to improve outcomes in clients' health care and educate clients to support their self-care (Konttila et al., 2018). It must also enable recruits to participate fully in all the work, leadership, education and research activities associated with a highly committed, professional and responsive workforce (Lepistö et al., 2018).

Inter alia, educators need to provide strong role models in their professional conduct for the students, have adequate pedagogical competence to enhance their students' learning, utilize the most effective and engaging methods to educate and motivate students, and have strong management competence in their own work (Fowler et al., 2017). They must also be able to handle high workloads (Nilsson et al., 2017) and take responsibility for their own further continuous professional development, not only in their health and social care niches, but also as educators (McMahon, 2017). In a recent study, educators also expressed needs to adjust rapidly to changes in global socio-political environments and for collaboration between multi-disciplinary educators, organizations and students to foster improvements in sustainable health and social care (Mikkonen

et al., 2019). They also recognized requirements for cultural awareness and ability to promote the integration of young immigrant workers in health and social care settings (Mikkonen et al., 2019). However, reductions in educational resources, due to shortages of highly qualified professionals and appropriate training, hinder educators' maintenance of competence and professional growth (Zamani-Alavijeh et al., 2019).

However, previous studies have emphasized that health and social care educators' competence is complex and encompasses diverse areas of their competence. Thus, there is a clear need for a psychometrically validated instrument to enable clarification and assessment of the required competence. Several instruments have been previously used to define certain areas of educators' knowledge, skills and/or attitudes, but not all of the required skills and abilities, so there is a clear need to develop a new instrument for measuring all the multidimensional aspects of educators' competence (Mikkonen et al., 2018). In addition, in a very recent qualitative study, involving interviews with 48 health and social care educators, we found that educators' competence is a complex phenomenon, encompassing at least nine dimensions (Blinded-for-review). We also recognized a need to develop a new instrument capable of identifying factors associated with their levels of competence and estimating their competence in all of the dimensions, the significance of these dimensions in their daily work and relationships among the dimensions.

Background

Internationally, nurse educators' competence has been precisely defined, and recognized as encompassing: theories and principles of adult learning; curricula & their implementation; nursing practice; research & evidence; communication, collaboration & partnership; ethical/legal principles & professionalism; monitoring & evaluation; and management, leadership & advocacy (WHO, 2016). We also recently identified the following dimensions of health and social care educators' competence (in addition to the ability to practice as an educator): subject, ethical, pedagogical, management & organizational, innovation & development, collaboration; cultural & linguistic; and continuous professional development competence (Blinded-for-review). Requirements to practice as a health and social care educator are set by regulations and policies that vary among countries. Health and social care include the following professions: dental hygienist, dental technician, medical technologist, midwife, occupational therapist, optician, osteopath, paramedic, physical therapist, podiatrist, prosthetist, public health nurse, radiographer, rehabilitation counselor, registered nurse, or social service worker (University of Applied Science Act 2014/932; WHO, 2013a). In Finland, requirements for health and social care educators include a professional degree (in health or social care profession), 3 to 5 working years of work experience, and a Master's and/or

Doctoral degree with pedagogical training amounting to at least 60 European Credit Transfer and Accumulation System (ECTS) (University of Applied Science Act 2014/932). Professional degree and working years of work experience are not applicable for school teachers for instance. For health and social care educators subject competence encompasses multi-professional knowledge, evidence-based knowledge (Koivula et al., 2011), as well as deep competence in one's area of expertise and integration of theory in professional practice (Mikkonen et al., 2019). Ethical competence includes knowledge and application of appropriate ethical codes, human morals and ethical work practices (Salminen, 2016). Pedagogical competence has been most extensively researched (Mikkonen et al., 2018) and encompasses. This encompasses proficiency in handling: the increasing trend of digitalization in teaching and learning (Virtanen et al., 2017); student-centered pedagogy (Zawacki et al., 2016); diverse teaching methods (Chiou et al., 2015); integration of theoretical knowledge in clinical practice and/or job-relevant competence (Pitkänen et al., 2018); evaluation, reflection and meeting needs of culturally and linguistically diverse students in an integrated fashion (Mikkonen et al., 2018; Mikkonen et al., 2019). It is also essential for educators to have skills in management & organization, innovation & development, and collaboration (in addition to competence in traditional basic pedagogy in classroom settings). In comparison, school teachers' competence encompasses a more limited amount of areas when compared with health care educators as presented in the previous discussion: content and pedagogical knowledge; beliefs, motivation, and self-regulation (Baumert and Kunter, 2013). Burgener and Barth (2018) have further included the importance of building open learning environments by involving the community and the framing of a meaningful context for students, which results in supporting students' competence development. *Inter alia*, health and social care educators are required to have competence in creativity, innovative ideas, and participation in research and developmental projects in collaboration with national and international colleagues in order to respond effectively to rapidly changing health and social care environments (Boger et al., 2018).

The Study

Aim

The purpose of this study was to develop and psychometrically validate an instrument (the HeSoEduCo) for assessing health and social care educators' competence in higher and professional education. The following research questions were addressed: 1) What is the face and content validity of the HeSoEduCo instrument? 2) what is its construct validity and reliability for exploring health and social care educators' competence?

Design

A cross-sectional design was employed.

Participants

All health and social care educators based in all 21 universities of applied sciences in Finland (N=1851) and seven vocational colleges (N=479) were invited to participate in the study. The inclusion criteria were: a health and social care professional background (according to the criteria of the University of Applied Science Act 2014/932; WHO, 2013a), either part- or full-time involvement in education as a lecturer and/or principal lecturer at a university of applied sciences or vocational college. The exclusion criteria were: an educator without any health and/or social care professional background, and/or not educator involved in education or development of the education (e.g. secretary). The minimum required sample size was estimated in light of the recommendation of recruiting a sufficient number of participants in order to evaluate construct validity for the instrument (DeVon et al., 2007). In this study we achieved 9 participants per HeSoEduCo variable.

Data Collection

Data were collected in October-December 2018. An invitation to participate in the study was sent to a contact person in each organization, except one (which provided email addresses of educators to one of the researchers, KM). Candidates for participation were sent an email, either via a contact person or directly, including information regarding the project, its aim, inclusion criteria, the voluntary and anonymous nature of participation and benefits of participants' input in the study. It also provided a Webropol link to the questionnaire described below. The invitations were sent four times at intervals of 3-4 weeks from the first invitation. Since the researchers could not contact educators personally (except at one organization), the invitations' delivery depended on the contact person in each organization. The researcher (KM) collecting data requested a confirmatory email from each contact person after the first invitation and the reminders. The data collection process, including the dates and names of organizations involved, was fully documented in a diary to maximize repeatability, chances of detecting potential date- or organization-related anomalies, and hence reliability.

The instrument

The Health and Social Care Educator's Competence (HeSoEduCo) instrument used to collect data was developed for the purposes of this study. It was subjected to rigorous psychometrical tests, described in detail in the *Data Analysis* sub-section, and the findings obtained from its implementation are described in the *Results* section. It includes nine background questions and 56

items covering the following competence areas of educators: economic, administrative, management & leadership; communication, collaboration & societal; subject & ethics; research, development & innovation; pedagogical; and cultural & linguistic diversity competence. The background questions seek information on participants' age, gender, educational background and other factors relating to their employment. The other items invite 1-4 Likert scale responses: 1 – fully disagree; 2 – disagree to some extent; 3 – agree to some extent; and 4 – fully agree.

Ethical Considerations

Before the main data collection process, experts involved in a broader project including this study, evaluated the study's social value and ethical implications (Stang, 2015). The study involved human participants: health and social care educators. However, according to Finnish regulations there was no need for formal authorization to conduct the planned research from an ethical committee. This was because the study would not violate the subjects' physical integrity, use data (such as registers or archive records) without informants' consent, involve children less than 15 years old, have potentially harmful psychological or physical effects on the participants, or pose threats to their security (Declaration of Helsinki, 2013). Permission to conduct the research was obtained from each organization involved in the study. Agreement to participate in the study and share anonymously provided data via the link in the invitation letter was taken as evidence of voluntary participation. No data regarding individual participants are reported, thereby avoiding potential risks of exposing participants indirectly. The study was supported by a data management plan formulated in accordance with the EU's General Data Protection Regulation (2016) and Finnish Personal Data Act (523/1999). The data are stored in files protected by Oulu University and will be archived for 50 years after completion of the project.

Instrument Development and Validation

The HeSoEduCo instrument's development began with creation of a theoretical framework, by defining concepts and measurable entities for descriptive data (Likert-type items). The first steps included a previously published systematic review of elements of educators' competence (Blinded-for-review). The review identified the competence as being split into knowledge (including subject, evidence-based knowledge, codes of ethics, and entrepreneurship); skills (including pedagogical, networking, problem solving, leadership, research, technology, mentoring, and clinical); and attitudes (including research, entrepreneurship, personality factors, and self-development) (Blinded-for-review). Subsequently, 48 health and social care educators' views on educators' competence were interviewed, as reported by Blinded-for-review (2019), including the dimensions of subject, ethical, pedagogical, management & organizational, innovation & development, collaboration;

cultural & linguistic; and continuous professional development competence (Blinded-for-review). Based on the evidence obtained from these studies, 71 items with six sub-dimensions were developed: economic, administrative, management & leadership; communication, collaboration & societal; subject & ethics; research, development & innovation; pedagogical; and cultural & linguistic diversity competence.

Next, before the main data collection process reported here, the instruments' face and content validity were evaluated. Face validity refers to an instrument's educational appropriateness, understanding of meanings, logical flow, and grammar or syntax of items (Rattray and Jones, 2007), while content validity refers to its relevance, clarity and coverage of the content domain (DeVon et al., 2007). These features were assessed by an expert panel, then re-assessed by the experts after amendment of some items. The final assessment included acquisition of both individual item-level and scale-level Content Validity Indices (I-CVI and S-CVI, respectively) (Lynn, 1986; Polit et al., 2007). The CVI was obtained from 4-scale ratings of each item: 1, not relevant; 2, somewhat relevant; 3, quite relevant; and 4, highly relevant. Clarity was evaluated in the same manner. The I-CVI scores were calculated by summing quite relevant (3) and highly relevant (4) scores for each item then dividing the total by the number of experts participating in the evaluation (Polit et al., 2007). The recommended threshold for retaining an item is ≥0.78. The S-CVI was calculated by summing scores for each I-CVI and dividing the total by the number of items. Recommended threshold S-CVI scores for 'excellent' and 'good' content validity are ≥0.90 and 0.70-0.80, respectively (Polit et al., 2007).

As reported in the *Results* section, the instrument appeared to have sufficient face and content validity for our purposes, and thus was applied to acquire data on the participants' perceptions. The acquired data were then subjected to preliminary analysis and cleaning, as follows. The likelihood that missing data were not available for random rather than systematic reasons (and thus did not pose threats of systematic bias) was assessed by calculating Missing at Random (MAR), Missing Completely At Random (MCAR) and Missing Not at Random (MNAR) values. The cut-off for removing missing data was set at ≥5% listwise. Univariate and multivariate outliers were examined to ensure that the dataset had sufficient univariate and multivariate normality for high quality confirmatory factor analysis. Multivariate outliers were identified by calculating Mahalanobis distances, with a threshold p-value of <0.01. Mardia's kurtosis index was used to confirm that the data had sufficient multivariate normality of the data (with a threshold set at 3017.86). (Lombardi and Pastore, 2012).

After data normalization and before construct validity testing, item-to-total score correlations were tested by calculating Cronbach's alpha values, with a cut-off for items in the instrument set at <0.30. Construct validity was then tested by confirmatory factor analysis (CFA) to confirm the validity of the underlying structure of set variables. The observed and latent variables were organized according to the theoretical structure and content validity of the instrument. Next, CFA was conducted with the Maximum Likelihood (ML) approach and the following general goodness of fit indexes were calculated: Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Residual (SRMR), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI). The threshold RMSEA and SRMR values for an optimal CFA model were set at <0.08, and threshold CFI and TLI values at >0.09 (Byrne, 2009; Kline, 2010). The CFA was performed using Stata (V12.0) (StataCorp, 2011).

Finally, the reliability of the scores was assessed by calculating Cronbach's alpha values for each of the sub-dimension, which indicate their accuracy, consistency and reproducibility for measuring the attributes they are supposed to measure (DeVon et al., 2007). Generally, threshold Cronbach's alpha values of ≥0.90, ≥0.80 and ≥0.70 are recognized for clinically reliable, well-established and newly designed research instruments, respectively (DeVon et al., 2007).

Results

Participants

Out of 2 330 invited candidates, 422 chose to participate, giving a response rate of 18%. After the preliminary data analysis and normalization process, data for 32 (8% of the total) of the participants representing multivariate outliers were removed in the instrument validation phase. Thus, responses of the remaining 390 participants are reported here (see Table 1). The average age of those educators was 51 years (standard deviation, 8.54 years). Most of the participants were female (352; 90%), most had a Doctoral degree (277; 71%) and/or Master's degree (82; 21%), and the mother tongues of 361 (93%) and 29 of them were Finnish and Swedish, respectively. All but one had obtained at least 60 ECTS in teacher training, in health sciences (213; 55%), vocational teacher training (139; 36%) or educational sciences (37; 10%). Most worked at universities of applied sciences (310; 80%), and the rest at vocational colleges (80; 21%), with 14 years (standard deviation, 8.78 years) working experience, on average, as an educator. Professionally they were employed in departments of social services (77; 20%), health care (245; 63%), rehabilitation (30; 8%) and mixed departments (38; 10%). Most were lecturers (267; 69%) and/or full-time educators (64; 16%).

An instrument development phase

Face and content validity

The face and content validity of 71 newly developed items were assessed with experts in two evaluation rounds. Invited experts included health and social care educators, educational leaders, project managers, development workers, teacher candidates and educational researchers. The first panel, of 15 experts, assigned the instrument I-CVI scores for relevance ranging from 0.60 to 1.00, and an S-CVI score of 0.86. The I-CVI scores for clarity ranged from 0.20 to 1.00, with a total S-CVI score of 0.79. Following the first expert panel's assessment, 26 of the total of 71 items were amended, and 26 were deleted, leaving 45 items. Due to these corrections and deletions, another panel (of seven experts) assessed the revised instrument, and assigned I-CVI scores for relevance ranging from 0.33 to 1.00, with an S-CVI score of 0.89. The I-CVI scores for clarity ranged from 0.66 to 1.00, with an S-CVI score of 0.94. Following this assessment, 21 out of the 45 items were amended with minor grammatical modifications and eleven were added through the previous items being split and simplified. The final instrument before the pilot study included 56 items.

After evaluation of the instrument's face and content validity, a pilot study was conducted with 33 educators, to evaluate the practicality, understandability and interpretations of the items and the technical functionality of the survey. The participants could provide comments on the items, if they wanted. The pilot study did not indicate requirements to change any items, so the educators who participated in it were included in the main data collection sample.

Psychometric validation

Construct validity and reliability

Preliminary analysis of the information acquired from the participating educators showed there was no missing data, and the Mardia´s kurtosis value was 3248, exceeding the threshold set for multivariate normality in this study (3017.86). Three items with lower than the threshold item-to-total correlation (<0.30 Cronbach's alpha loading values) were removed. Nine items that introduced higher than acceptable cross-loading (and hence unsatisfactory goodness of fit) in the CFA model were also removed. The final CFA model included eight factors defining the following competence areas for educators: evidence-based practice, digital collaborative learning, student-centered pedagogy, collaboration & societal, leadership & management, cultural & linguistic diversity, mentoring students in professional competence development, and subject & curriculum, and, covered by 8, 5, 8, 5, 6, 4, 4 and 3 items, respectively (see Figure 1 and Table 2). Cronbach's alpha values for the factors ranged from 0.70 to 0.89 (Table 2). General goodness of fit index values

indicated that the instrument has adequate validity: Chi-square = 1936.406 ($p < 0.01$); RMSEA (90% CI) = 0.051; SRMR = 0.059; CFI = 0.877; TLI = 0.867; CD = 1.000 (Table 3).

Sensitivity analysis

The sensitivity analysis of construct validity upon the HeSoEduCo instrument was conducted by an exploratory factor analysis (EFA) with principal axis factoring and promax rotation. The Kaiser-Meyer-Olkin test (0.912) and Bartlett's Test of Sphericity (7386.517; df=903; $p<0.01$) showed acceptable values of performing EFA. The cumulative percentage of variance explained eight factors loading of 60%, with an acceptable recommendation according to Munro (2005). The cut-off of exploratory factor analysis factor loading was set at <0.30 (Pett, 2003). The individual factor loadings and percentages of total variance are presented in Supplementary File 1.

Discussion

The purpose of this study was to develop and psychometrically validate an instrument to assess health and social care educators' competence in professional education (the HeSoEduCo instrument). Instruments developed in previous studies have been designed to investigate: educators' future plans and perceptions of important skills (Coplen et al., 2011); educators' perceived conceptions of teaching and teaching practices (Kell and Jones, 2007); and utilization of research by nursing teachers (Koivula et al., 2011). Others have been used to explore: educators' knowledge of ethical codes (Numminen et al., 2011); and nursing teachers' attitudes towards entrepreneurship (Salminen et al., 2012). Salminen et al. (2013) has developed an instrument measuring the competence of nurse educators, including their pedagogical and evaluation skills, relationships with students and personality factors (Salminen et al., 2013). When compared with previous instruments, the HeSoEduCo instrument encompasses a wider range of needed competence in health and social care education.

Confirmatory factor analysis of the validated instrument identified eight significant dimensions (43 items) of educators' competence: evidence-based practice, digital collaborative learning, student-centered pedagogy, collaboration & societal, leadership & management, cultural & linguistic diversity, mentoring students in professional competence development, and subject & curriculum. The goodness of fit index of CFA model had adequate validity but did not approach the cut-off index (Comparative Fit Index (CFI), Tucker-Lewis Index (TLI)). According to Byrne (2009) the values of an instrument approaching the cut-off of the goodness of fit index are suitable for the validation of a newly developed instrument. The EFA model, tested in sensitivity analysis,) included factors with lower than 5% of variance explained. Commonly, a newly developed

instrument with a large number of items may involve a low percentage of variance explained by single factors (Pett, 2003). Therefore, the items of the HeSoEduCo instrument need to be revisited and possibly modified, when considering the theoretical representation of the phenomenon. Content validity, with the involvement of an expert panel on the subject, can further enhance the validity of the instrument (Polit et al., 2007).

The item-to-total score correlations were tested by calculating Cronbach's alpha values, which ranged from 0.37 to 0.83 in variation. The cut-off for items in the instrument was set at the value <0.30 (DeVon et al., 2007). The Cronbach's alpha of factors of the instrument ranged from 0.70 to 0.89, showing that certain factors reached values of ≥0.80. These can be interpreted as well-established factors, and ≥0.70 as newly designed factors of the instrument (DeVon et al., 2007). The HeSoEduCo instrument presented a sufficient level of validity and reliability, despite including a large number of items and sub-dimensions (Munro, 2005).

The HeSoEduCo instrument can be used to measure educators' levels of competence and also identify relationships among the dimensions. The evidence-based practice dimension is covered by items on evidence retrieval, critical evaluation, integration of evidence to guide students and its use in practice, and knowledge development. The importance of evidence-based practice for fostering it in client care at both postgraduate (Hickman et al., 2018) and undergraduate (Fiset et al., 2017) levels is frequently discussed. Moreover, it has clear importance in practice for professionals in both health (Patelarou et al., 2013) and social care (Mullen, 2014) sectors. However, educators have been shown to lack sufficient competence in evidence-based practice, although even short targeted educational courses can significantly improve their awareness of its necessity (Nichols, 2017).

In this study, pedagogical competence was split into three dimensions representing competence in a digital collaborative learning, student-centered pedagogy and mentoring students in professional competence development. This is partly because pedagogical competence of educators in health and social care essentially has an intermediate position between teaching *per se* and mentoring students in setting their own goals and striving to develop their careers rapidly in a self-guided manner (Cartney, 2018). They must also be familiar with uses of various kinds of digital technology with educational applications, which are being increasingly used to support, motivate and help students reach their learning goals (Koekoek et al., 2018).

Collaboration & societal is covered by items concerning engagement with organizations outside educators' own institutions, other educators and on-the-job learning placements. In professional working practice, for example clinical practice, health care professionals frequently need to

collaborate in multi-professional teams to identify and implement optimal client care (McCarthy and DiGiovanni, 2017). Health science educators also frequently participate in research project development, collaboration and publication (Huang Schiller et al., 2017). On the European level, educators have possibilities to participate in teacher exchange programs, thereby exploiting the mobility across most of the continent enabled by the EU (Taylor and Fry, 2010). However, multi-disciplinary networking in education (nationally and internationally) is a growing area of competence development (Adegbola, 2010) and regarded as an increasing necessity by educators' themselves, as teaching resources are declining (Mikkonen et al., 2019).

The leadership & management dimension of the new instrument is covered by items regarding the handling of educators' administrative tasks, knowledge of education legislation and guidelines, competence in leading people and the ability to adapt to rapid changes in educators' work. The importance of leadership and management in health care education has been emphasized recently, together with needs to develop educators' self-management and abilities to lead efforts to address work- and people-related issues (Heinistö et al., 2018). Educators also have major roles to play in the development of leadership in health care practices, for example, nurses' ability to handle the increasing authority they are receiving in advanced nursing practices (Chipps et al., 2018), and management culture in their respective disciplines (Bleich, 2018).

The cultural and linguistic diversity dimension is covered by items concerning abilities to guide and sensitively treat culturally and linguistically diverse students, and collaborate with international educators. Students are becoming increasingly diverse, culturally and linguistically, in health care settings because of political changes, globalization and opening of borders between countries (Bologna, 2005). Previously interviewed educators have recognized the need for competence to integrate cultural diversity in their daily education with students and international collaborators (Mikkonen et al., 2019). In addition, health care students from non-native backgrounds face substantial challenges, especially when they leave academic environments (Pitkäjärvi et al., 2011) and enter professional practice and must develop their practical competence (Mikkonen et al., 2017). Accordingly, recent studies have strongly emphasized the need for cultural mediation by educators between students and their mentors in professional working life practices (Mikkonen et al., 2016; Mikkonen et al., 2017; Oikarainen et al., 2018).

In a previous study, subject competence was defined as a separate, important dimension of health and social care educators' role in preparing students for professional conduct (Mikkonen et al., 2019). However, in this study, items covering the subject aspect of competence highly correlated

with items covering curricular work. Curricular competence for nurse educators has been described in detail by the WHO (2016), and defined as encompassing the ability to design, implement, and evaluate curricula by integrating evidence and engaging students in the developmental work. Broad views of degree programs also have recognized importance for providing educators with more holistic views of their own subjects and guiding them to multi-disciplinary collaboration with other educators in their daily educational work (McCarthy and DiGiovanni, 2017).

Limitations

The study has several limitations. First, the response rate of the study was only 18%. This may have been partly because data were collected during October-December 2018, when some of the educators may have been having a fall break (the timing of which varies across the country, complicating attempts to reach all of them). The response rate may have been higher if the data collection had started earlier. Secondly, a major cross-sectional study with international participants is needed to enhance the instrument's validity, increase understanding of its validity (and possible improvements), and acquire indications of its wider generalizability. Thirdly, the instrument includes eight sub-dimensions, which causes challenges when construct validating an instrument. The construct validity was enhanced by performing a sensitivity analysis of the instrument. Further data collection and construct validity needs to be performed to enhance the validity and reliability of the instrument.

Conclusion

The instrument (HeSoEduCo) developed in this study proved to be valid and reliable for measuring eight dimensions (confirmed by factor analysis) of health and social care educators' competence. The instrument has been validated in a large-scale test and is the first to provide inter-professional scope for assessment of educators' competence, to our knowledge. It was developed by developing the theoretical framework systematically, initially constructed using evidence-based knowledge from previous studies, then refined via an inductive qualitative approach, involving diverse experts to evaluate its face and content validity, and finally using reliable psychometric methods to enhance its construct validity.

The instrument can be used to obtain self-evaluations of educators' competence when assessing their general competence levels, and help human resources departments and managers to identify suitable continuous education programs for their staff. In addition, it can be used to collect large-scale data on meanings of competence in educators' daily work, the relationships between the

dimensions of competence, and identify factors related to their levels of competence. Such knowledge is valuable for curricular development of teacher education programs.

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Figure 1. Path diagram for Model derived by Confirmatory Factor Analysis of HeSoEduCo scale (n=390).

Table 1. Demographic information of participants (n=390)

Variable	n	%
Age in years	51 (8.54)[1]	
Gender		
Female	352	90.3
Male	36	9.2
Didi not want to indicate	2	0.5
Education		
Vocational college	1	0.3
University of applied sciences (Bachelor's degree)	3	0.8
University of applied sciences (Master's degree)	27	6.9
Master's university degree	277	71.0
Doctoral university degree	82	21.0
Language		
Finnish	361	92.6
Swedish	29	7.4
Year of graduation for highest degree	2006 (7.89)[1]	
Teacher training (pedagogical education, 60 ECTS		
Vocational teacher training	139	35.6
Teacher training in health sciences	213	54.6
Teacher training in education sciences	37	9.5
No teacher training	1	0.3
Current work organization		
Vocational college	80	20.5
University of applied sciences	310	79.5
Work experience as an educator	14 (8.78)[1]	
Current teacher work field		
Social services	77	19.7
Healthcare	245	62.8
Rehabilitation	30	7.7
Social services, healthcare and rehabilitation	38	9.8
Job description		
Part-time educator	12	3.1
Full-time educator	64	16.4
Lecturer	267	68.5
Principle lecturer	38	9.7
Head of degree program	9	2.3

[1]Mean (standard deviation)

Table 2. HeSoEduCo scale's items (n=390)

Factor representing competence areas of educators	Items		Mean (standard deviation)	Skewness	Kurtosis	Cronbach alpha if item deleted	Item to total correlation
COMPETENCE IN EVIDENCE-BASED PRACTICE (α=0.84)	1.	I can search for research evidence from the most common databases independently (i.e. Pubmed, Cinahl, Medline).	3.55 (0.67)	-1.36	1.09	0.81	0.68
	2.	I can critically evaluate the validity of research.	3.57 (0.55)	-0.87	-0.26	0.81	0.67
	3.	I can identify the process of evidence-based practice (search for evidence, implementation and evaluation).	3.50 (0.65)	-1.07	0.47	0.82	0.57
	4.	I can explain the importance of evidence-based practice in social and health care.	3.72 (0.51)	-1.81	3.10	0.82	0.58
	5.	I can guide students in finding the best possible knowledge for	3.66 (0.50)	-1.01	-0.19	0.82	0.62

		decision making (e.g. clinical practice guidelines, summarized evidence).				
	6.	I utilize evidence-based knowledge in my teaching (e.g. clinical practice guidelines, reviews).	3.80 (0.41)	-1.70	1.53	0.82	0.58
	7.	I can produce scientific knowledge.	3.36 (0.64)	-0.61	-0.05	0.83	0.50
	8.	I continuously follow scientific publications in order to develop my competence.	3.24 (0.72)	-0.59	-0.19	0.84	0.47
COMPETENCE IN DIGITAL COLLABORATIVE LEARNING (α=0.89)	9.	I can use a variety of tools for collaborative work and interaction in virtual learning.	3.03 (0.73)	-0.24	-0.54	0.85	0.83
	10.	I can design virtual learning that promotes students' collaborative building of	3.08 (0.76)	-0.42	-0.40	0.85	0.83

	knowledge.					
	11. I know how to identify students' needs for guidance in virtual teaching.	2.93 (0.77)	--0.12	-0.78	0.86	0.77
	12. I know my own role as an educator in virtual teaching.	3.27 (0.76)	-0.74	-0.13	0.86	0.76
	13. I can manage communication channels needed during my work as an educator (i.e. digital communication).	3.38 (0.61)	-0.43	-0.65	0.81	0.51
COMPETENCE IN STUDENT-CENTRED PEDAGOGY (α=0.83)	14. I use student-centered methods in my teaching or guidance.	3.57 (0.54)	-0.75	-0.53	0.80	0.68
	15. I can motivate students to strive for continuous professional development.	3.65 (0.48)	-0.75	-1.09	0.80	0.65
	16. I can guide students in different stages of their learning	3.68 (0.69)	-1.11	-0.01	0.80	0.68

	process.					
	17. I know how to take into account the individual needs of students in the planning of teaching or guidance.	3.52 (0.56)	-0.66	-0.57	0.81	0.62
	18. I know how to provide constructive feedback on students' learning and competence.	3.75 (0.44)	-1.22	-0.23	0.82	0.55
	19. I know pedagogical foundations of collaborative learning.	3.43 (0.63)	-0.70	-0.19	0.83	0.53
	20. I can interactively collaborate with students during teaching and supervision.	3.91 (0.30)	-3.05	8.48	0.83	0.38
	21. As an educator, I act in accordance with ethical principles.	3.93 (0.25)	-3.33	9.13	0.83	0.40

COMPETENCE IN COLLABORATION & SOCIETAL (α=0.77)	22. I can guide interprofessional student groups through clinical or on-the-job learning placements.	3.07 (0.80)	-0.25	-1.09	0.76	0.54
	23. I have adequate competence to teach interprofessional student groups.	3.27 (0.68)	-0.49	-0.43	0.74	0.60
	24. I know how to exert social influence.	2.97 (0.81)	-0.31	-0.65	0.76	0.55
	25. I know how to utilize diverse opportunities for working life cooperation in teaching.	3.28 (0.66)	-0.44	-0.51	0.75	0.56
	26. As an educator, I can professionally collaborate with various organizations (public sector, third sector, and companies).	3.64 (0.55)	-1.24	0.57	0.76	0.52
COMPETENCE IN LEADERSHIP & MANAGEMENT (α=0.75)	27. I can manage my work (i.e. schedule, priorities, tasks).	3.43 (0.67)	-0.85	0.01	0.72	0.51

	28. I am competent in managing tasks and leading people.	3.59 (0.52)	-0.71	-0.79	0.71	0.57
	29. As an educator, I know the responsibilities that have been assigned to me by the organization I work for.	3.71 (0.50)	-1.48	1.25	0.72	0.53
	30. I can complete financial tasks related to educators' work.	3.09 (0.79)	-0.60	-0.05	0.72	0.54
	31. I adapt to rapid changes in educators' work.	3.47 (0.64)	-0.98	0.63	0.75	0.37
	32. I know the legislation and guidelines relating to the work of educators.	3.43 (0.55)	-0.26	-0.92	0.73	0.48
COMPETENCE IN CULTURAL & LINGUISTIC DIVERSITY (α=0.77)	33. I know how to guide culturally and linguistically diverse students.	3.10 (0.70)	-0.32	-0.37	0.65	0.71
	34. I can identify cultural differences in students' learning.	3.05 (0.74)	-0.22	-0.71	0.68	0.65

	35. I can treat culturally and linguistically diverse students equally.	3.67 (0.54)	-1.39	1.00	0.76	0.51
	36. I know how to collaborate internationally.	3.16 (0.85)	-0.69	-0.38	0.68	0.50
COMPETENCE IN MENTORING STUDENT INTO PROFESSIONAL COMPETENCE DEVELOPMENT (α=0.70)	37. I know how to support mentors of students completing clinical on-the-job learning placements when they face challenging situations during their mentoring.	3.55 (0.60)	-0.98	-0.03	0.61	0.55
	38. I can evaluate students' learning and competence based on evaluation criteria.	3.71 (0.46)	-1.09	-0.38	0.60	0.55
	39. I can collaborate with mentors of students completing clinical or on-the-job learning placements.	3.87 (0.35)	-2.54	5.66	0.68	0.40

	40. I can integrate theoretical knowledge into practice in teaching.	3.82 (0.39)	-1.80	1.68	0.63	0.50
COMPETENCE IN SUBJECT & CURRICULUM (α=0.75)	41. I know the curriculum of the degree program that I teach.	3.77 (0.43)	-1.45	0.64	0.70	0.57
	42. I can develop the curriculum.	3.62 (0.58)	-1.43	1.86	0.60	0.63
	43. I can adhere to the principles of competence identification and recognition.	3.53 (0.58)	-0.88	0.21	0.69	0.56
Total Cronbach alpha	α=0.93					

Table 3. Confirmatory Factor Analysis goodness of fit index

Fit indexes	Statistical values	Statistically recommended cut-point
Chi-square	1936.406	
	<0.001	
RMSEA (90%CI)	0.051	< 0.08
SRMR	0.059	< 0.08
CFI	0.877	> 0.90
TLI	0.867	> 0.90
CD	1.000	

RMSEA, Root Mean Square Error of Approximation; SRMR, Standardized Root Mean Residual; CFI, Comparative Fit Index; TLI, Tucker-Lewis Index; CD, Coefficient of Determination

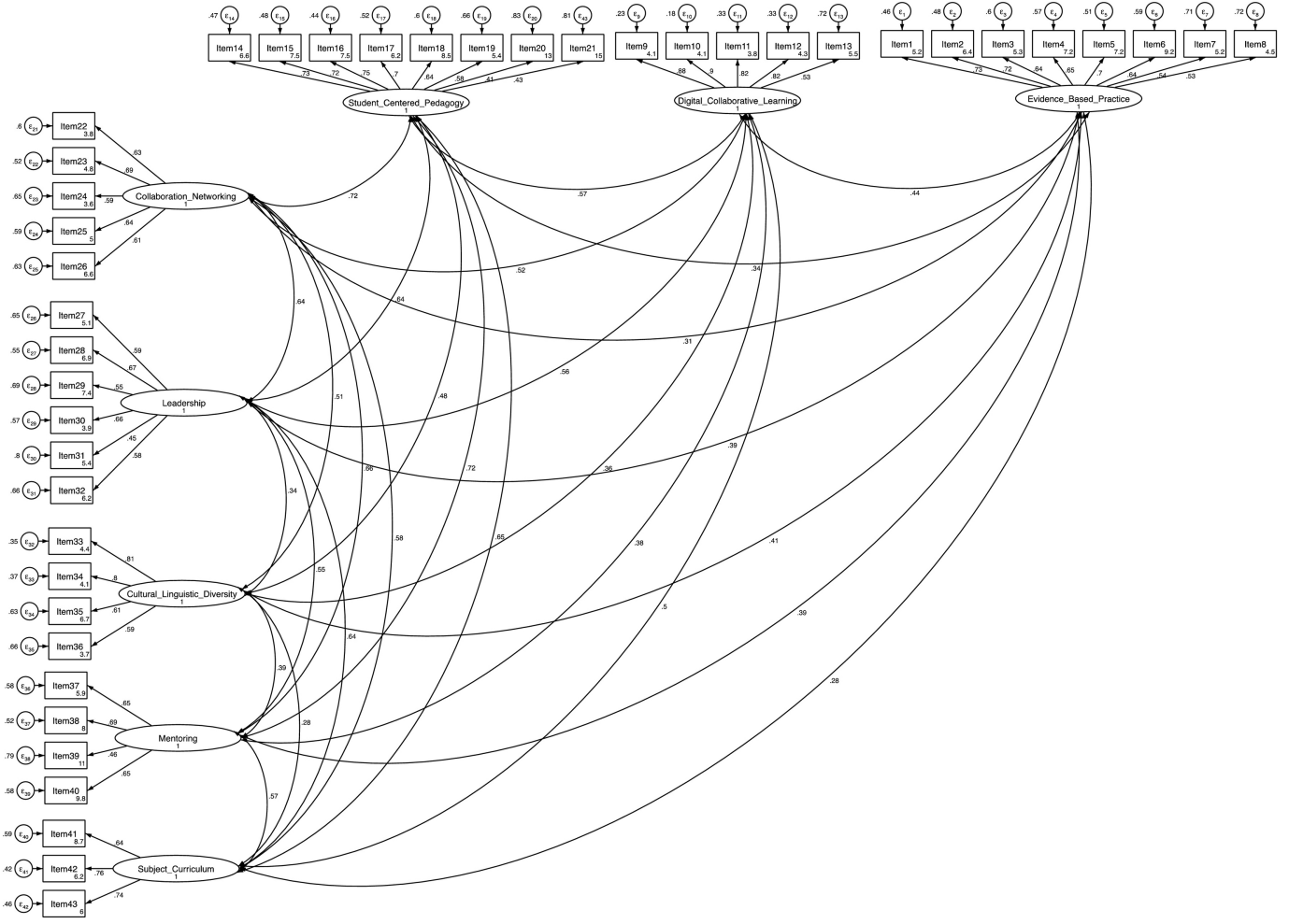
Item14 6.6
Item15 7.5
Item16 7.5
Item17 6.2
Item18 8.5
Item19 5.4
Item20 13
Item21 15
Item9 4.1
Item10 4.1
Item11 3.8
Item12 4.3
Item13 5.5
Item1 5.2
Item2 6.4
Item3 5.3
Item4 7.2
Item5 7.2
Item6 9.2
Item7 5.2
Item8 4.5
Student_Centered_Pedagogy
Digital_Collaborative_Learning
Evidence_Based_Practice
Item22 3.8
Item23 4.8
Item24 3.6
Item25 5
Item26 6.6
Collaboration_Networking
Item27 5.1
Item28 6.9
Item29 7.4
Item30 3.9
Item31 5.4
Item32 6.2
Leadership
Item33 4.4
Item34 4.1
Item35 6.7
Item36 3.7
Cultural_Linguistic_Diversity
Item37 5.9
Item38 8
Item39 11
Item40 9.8
Mentoring
Item41 8.7
Item42 6.2
Item43 6
Subject_Curriculum

Figure 1