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Research

# The hybrid education competence of educators in the social, healthcare, and health science fields: a cross-sectional study

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ABSTRACT

*Background:* Hybrid education has become a topical issue, and identified as an area for development.
*Aim:* The aim of this study was to describe and explain educators' hybrid education competence areas in higher education and the factors associated with these areas.
*Methods:* The data was collected nationally in Finland using the HybridEduCom instrument (Likert scale 1–5) from social, healthcare, and health science educators (n = 1689) between August and November 2022, with a response rate of 12% (n = 206).
*Results:* Logistic regression analysis was used to identify the effects of educators' background factors on the hybrid education competence. Educators rated interaction competence as the strongest (3.15) and digital pedagogical competence as the weakest (2.78). Three clusters of competence profiles—A (an advanced level, 31.1%), B (a good level, 42.2%) and C (a beginner level, 26.7%)—were generated from the data, with a statistically significant difference ($p < 0.001$).
*Conclusions:* This study showed that educators need the most support in digital and ethical competences for hybrid education.


## Introduction

Skilled social and healthcare professionals and workers are needed worldwide to meet the future challenges of an ageing population and to manage diseases (World Health Organization (WHO), 2014). Health education ensures the attainment of high standards of competence. Educators in the field play an important role in delivering education and supporting the learning of future professionals, which is why attention must be paid to their competence (World Health Organization (WHO), 2016). Educators are required to have competence at a macro level, know-how to be innovative and develop new knowledge, integrate evidence-based healthcare, and to continuously develop their competence. At the micro level, they need to have pedagogical competence to teach and mentor students, collaborate with healthcare organizations and interprofessionally, be up to date on healthcare subjects, possess self-management and leadership skills, and master digital learning environments (Mikkonen et al., 2024).

Digitalization is believed to make the work of educators easier but requires them to master digital learning environments (Organization for Economic Cooperation and Development (OECD, 2020). Digitalization refers to a change in which analogue functions are replaced with digital devices and software. A digital learning environment integrates technology into education and learning to improve educational practices. (OECD, 2020; Ryhtä et al., 2020). Educators digital competences have been identified as an area for development, including training levels for holistic assessment and development support (Pajari et al., 2022; Redecker, 2017; WHO, 2016). One teaching method that has been increasingly utilized during recent years is hybrid teaching, which offers flexible ways for students to learn online, face-to-face, or asynchronously. Hybrid education is an intelligent education system model with programs that combine face-to-face and remote learning, using adapted technology (Jowsey et al., 2020). In this context, hybrid teaching refers to the simultaneous

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delivery of the remote and face-to-face mode of teaching. In hybrid teaching, the educators are required to have several competencies, as they have to take into account and guide 2 different groups—the face-to-face and remote learning groups—take care of equal interaction, and handle technical issues (Raes et al., 2020a; Zydney et al., 2019). The implementation of hybrid education is also seen as a challenge in ensuring the achievement of learning outcomes, and how students are assessed in hybrid education (Raes et al., 2020a,b). There has been some research on hybrid teaching (Raes et al., 2020a; Zydney et al., 2019), but to the best of our knowledge, research on the hybrid education competence of social and healthcare educators is scarce. The aim of this study was to describe and explain social and healthcare educators hybrid education competence and factors associated with this. The results can be used for developing training to implement hybrid education, reducing the workload of educators, and ensuring the quality of teaching, which also supports the development of students' competence.

## Background

Internationally, the minimum qualifications required for social and healthcare educators vary. In general, they should have a master's and/or doctoral degree, a specified number of years of experience in the social and healthcare professions, a certain level of accreditation in the social and healthcare field, and a certain level of pedagogical competence and achievements in scholarship (EU, 2013; NLN, 2017; Universities Act 558/2009; Universities of Applied Sciences Act 932/2014, §22). In the United States (US), social and healthcare educators are required to have certification for their competencies (Oermann, 2021). In Australia, social and healthcare educators are required to complete a diploma course, but there are no common national requirements for training qualifications (McAllister & Flynn, 2016; TAFE, 2022). In Europe, the European Credit Transfer and Accumulation System (ECTS) tool is used to make studies and courses more transparent (European Commission, 2023). ECTs are normally equivalent to 1 full academic study year. In Finland, a social and health educator is required to have 1) an appropriate higher degree, at least 60 ECTs or 35 ECTs of pedagogical studies, and 3 years of work experience in a position corresponding to the content of the teaching assignment; or 2) an appropriate university of applied sciences degree, at least 60 ECTs or 35 ECTs of pedagogical studies, and at least 5 years of work experience in social and healthcare tasks corresponding to a university degree (Decree, 2017). They teach bachelor degree level students like dental nurses, midwives, occupational therapists, optometrists, paramedics, physiotherapists, podiatrists, registered nurses, radiographers, rehabilitation counsellors or social workers (Government Decree on Universities of Applied Sciences 1129/2014). In this study, social and healthcare educators work at a university of applied sciences and health science educators work at a university. Health sciences educators teach in health sciences degrees, e.g., bachelor's and master's degrees in nursing science or health management.

WHO (2016) defines the areas of competency requirements for educators, including learning theories and principles, curriculum development, practical nursing competencies, evidence-based practice, interaction and collaboration, ethics and professionalism, assessment, and leadership. Mikkonen et al. (2024) described the competence requirements for social and healthcare educators in 8 areas: evidence-based practice, leadership and management, collaboration and social aspects, subject and curriculum, mentoring students in professional competence development, student-centered pedagogy, digital collaborative learning, and cultural and linguistic diversity. The factors associated with the competences of social and healthcare educators highlight the digital competence of educators, as they need to be able to effectively use technology in their teaching (Redecker, 2017). According to Ryhtä et al. (2022), the perception of social and healthcare educators of their own digital competence consists of pedagogical, digital, and ethical competence and educators perceive digital pedagogy as a positive aspect of their teaching. Health educators have experienced difficulties in integrating digital coteaching and resources could be used to implement student-centered pedagogy using digital environments (Mikkonen et al., 2022a).

The term 'hybrid teaching' is used variously. A hybrid learning environment is a setting that mixes face-to-face and remote teaching (Raes et al., 2020b). In this study, hybrid teaching refers to teaching that simultaneously involves both face-to-face and remote learners (Raes et al., 2020a). Terms like blended synchronous learning (Lakhal et al., 2021), synchronous hybrid learning (Rodriguez et al., 2022), and HyFlex (hybrid flexible) learning (Lavigne et al., 2022) have been used to refer to this kind of learning/teaching. One of the strengths of hybrid teaching is that it allows for a larger number of participants and a wider geographical representation for educators (Wang & Huang, 2018). In addition, hybrid teaching is believed to be a flexible teaching method, as it provides students with the freedom to choose whether to attend a lesson physically in class or remotely, thereby reducing unnecessary absences (Raes et al., 2020a).

In hybrid teaching, educators are required to possess theoretical knowledge and an understanding of how to design effective hybrid teaching methods and new pedagogical solutions (Raes et al., 2020a; Wang & Huang, 2018). They need to be able to pay equal attention to in-class and remote learners (Wang & Huang, 2018) and master appropriate teaching methods when combining traditional and online teaching (Raes et al., 2020b). In addition, instructors need to provide assignments and instructions for both face-to-face and remote learners (Wang & Huang, 2018). Small group work has been found to be more effective when groups comprise both remote and face-to-face students (Zydney et al., 2019). However, students have experienced inequality and a lack of sense of belonging in hybrid teaching (Lakhal et al., 2021), and the creation of mixed groups has been found to increase the sense of community of the entire group (Zydney et al., 2019). To ensure the competence of social and healthcare experts and professionals, the competence of health educators is highlighted. In order to support educators continuous learning, it is important to understand how educators themselves assess their hybrid teaching competence and which factors influence their competence.

## Methods

### *Aim and research questions*

The aim of this study was to describe and explain social, healthcare, and health science educators hybrid education competence in higher education and the factors associated with this. The following research questions were addressed in this study:

1. What kind of hybrid teaching competence profiles can be identified for social, healthcare, and health science educators?
2. Which factors are associated with the hybrid teaching competence of educators?

### *Study design*

A cross-sectional design was applied with the national single point-in-time measurement (Polit & Beck, 2017). The following is the strengthening the reporting of observational studies in epidemiology (STROBE) statement: Guidelines for reporting observational studies were used to report the study (Von Elm et al., 2007).

*Participants*

The following were the inclusion criteria: that the participant 1) is an educator in social, healthcare, or health sciences; 2) has performed teaching in a hybrid mode; and 3) was willing to participate in the study. The survey was sent to all educational organizations from which permission to conduct the survey was obtained in Finland. Eighteen organizations (of 22 total) participated in this study. The survey was sent to a total of 1689 educators at 5 universities and 13 universities of applied sciences, thereby geographically representing the distribution of the sample in Finland. In total, 206 participants responded to the survey, with a response rate of 12.19%. The sample size was estimated by counting Cohen's d effect size (moderate size) with previous data collected on the competence of social and healthcare educators in general (Mikkonen et al., 2024), thereby aiming to reach a minimum of 200 participants to attain the necessary effect size (Cohen, 1992).

*Instrument*

The data were collected using the hybrid education competence (HybridEduCom) self-assessment instrument (authors-blinded), which was developed by the authors. The HybridEduCom instrument (Jokinen et al., 2024) was psychometrically tested and revealed excellent reliability scores regarding factors ranging from 0.901 to 0.951, interpreted that alpha values above 0.70 are considered acceptable (DeVon et al., 2007; Mikkonen et al., 2022b). The instrument consisted of 5 sum-variables of competence: planning and resourcing competence in hybrid teaching (10 items), technological competence in hybrid teaching (8 items), interaction competence in hybrid teaching (10 items), digital competence in hybrid teaching (12 items), and ethical competence in hybrid teaching (6 items). Each respondent scored the items on a 5-point Likert scale (1 = poor, 2 = moderate, 3 = good, 4 = very good, 5 = excellent). The Cronbach's alpha values calculated for the instrument varied between 0.90–0.95, which demonstrates good internal consistency (DeVon et al., 2007).

*Data collection*

The data were collected in Finland through an online survey during the autumn of 2022 using the Webropol survey. The survey included 11 background questions and 46 HybridEduCom items. An electronic survey link was sent to all educators in the 20 organizations included in the study. The contact person of each organization forwarded an email to educators with the invitation letter, personal data protection disclosure, and survey link. The invitation letter was sent once, with 2 weekly reminders to encourage further responses.

*Data analysis*

The data were analyzed using IBM SPSS Statistics (V28.0.1.1) by 2 researchers (RJ and KM). Descriptive statistics were used to analyze the educators' socio-demographic and background data and were presented in percentages, means, standard deviations, and minimum and maximum values. Background data and hybrid teaching competence were analyzed using chi-square test, Fisher's exact test, and one-way analysis of variance (ANOVA). The detected differences between the profiles were considered statistically significant when $p < 0.05$ (Munro, 2005). Profiles of educators' hybrid teaching competencies were constructed using K-means cluster analysis through the identification of 3 clusters by analyzing 5 sum variables of HybridEduCom. The competence levels are interpreted as poor (<2.49), moderate-good (2.5–3.49), and very good-excellent (>3.5) on the Likert scale based on educators' self-evaluations of hybrid teaching competence. The distributions were analyzed using shapes and the Kolmogorov–Smirnov test. The Kruskal–Wallis test was used to test the significance of the difference between the means of the profiles, and this was subsequently confirmed using the Bonferroni correction method using the Mann–Whitney test. The significance was set at $p < 0.05$. Additionally, the binary logistic regression analyses were used to identify the significant factors associated with educators' hybrid teaching competencies. The goodness of model fit was assessed by the Omnibus test of model coefficients, Hosmer and Lemeshow test, and Cox & Snell and Nagelkerke R-square tests (Munro, 2005).

*Ethical considerations*

Permission to conduct research was granted by all organizations that participated in the study. Participation in the study was voluntary and all participants were treated with respect for human dignity and in accordance with research ethics (Guidelines of the Finnish Advisory Board on Research Integrity, 2012; WMA, 2013). In addition, the participants were asked to provide written consent to participate in the study; they were informed about the aims of the research, told that the data on their competence would be collected anonymously, and they were informed that their data would be stored and handled carefully (GDPR 95/46/EC, 2018; Polit & Beck, 2017.) According to Finnish legislation (The Medical, 1999), the opinion of the Research Ethics Committee was not required because the study did not collect sensitive data and did not affect the psychological integrity of the participants.

## Results

*Participant characteristics*

A total of 206 educators from 6 universities and 12 universities of applied sciences participated in this study. Most of the participants were female (85.9%), with the remaining participants male (12.6%) or those who choose not to report their gender (1.5%). The participants had a mean age of 49 years. Most of the educators worked at the university of applied sciences (82%), the rest at university (16.5%), or did not want to report (1.5%). Further, over half of the educators were lecturers at a university of applied sciences (63.1%) and the second largest number of educators were teachers at a university (12.1%). The majority reported that their highest degree was a master's degree (60.7%). The year of graduation with the highest degree varied from 1986 to 2022, with the average being 2011. Further, participants' work experience as an educator varied from 0 to 37 years, with an average of 11 years. Most of the educators were teaching in the fields of social and healthcare (77.7 %). The educators' work experience in social and healthcare varied from no work experience as an educator to 42.5 years of experience, with an average of 16 years of work experience as an educator. Almost all the educators (97.6%) had participated in national conferences, continuing education, and research and development projects in the last 2 years. In addition, educators experienced hybrid teaching for the last 2 years, with 39.8% having over 30 lessons (see Table 1).

*Educators' hybrid teaching competence profiles*

Three different competence profiles were created based on educators' self-assessment scores: Profile A, in which 31.1% (n = 64) demonstrated an advanced level of competence; Profile B, in which 42.2% demonstrated a good level of competence; and Profile C, in which 26.7% demonstrated beginner level of competence. There was no statistically significant difference in the sociodemographic information of the educators by profiles, except for work experience as an educator ($p = 0.002$) (see Table 1). Of the 5 sum-variables, all educators

**Table 1**
Sociodemographic information of educators (n = 206).

| Characteristics | Total sample n = 206 | Profile A Advanced n = 64 (31.1%) | Profile B Good level n = 87 (42.2%) | Profile C Beginner n = 55 (26.7%) | p-value |
|---|---|---|---|---|---|
| Age in years, n, (%) | | | | | 0.055[a] |
| mean (SD), (min–max) | 49.37(8.88) (31–67) | 50.16 (8.59) (33–64) | 47.69 (8.85) (31–65) | 51.13 (8.96) (31–67) | |
| Gender, n (%) | | | | | 0.488[b] |
| Female | 177 (85.9) | 57 (89.1) | 73 (83.9) | 47 (85.5) | |
| Male | 26 (12.6) | 7 (10.9) | 13 (14.9) | 6 (10.9) | |
| Does not want to answer | 3 (1.5) | 0 (0) | 1 (1.1) | 2 (3.6) | |
| Highest degree, n (%) | | | | | 0.793[b] |
| Bachelor's degree, university of applied sciences | 1 (0.5) | 1(1.6) | 0 (0) | 0 (0) | |
| Master's degree, university of applied sciences | 22 (10.7) | 6 (9.4) | 10 (11.5) | 6 (10.9) | |
| Master's degree, university | 125 (60.7) | 38 (59.4) | 56 (64.4) | 31 (56.4) | |
| Doctoral or licentiate degree | 58 (28.1) | 19 (29.7) | 21 (24.1) | 18 (32.7) | |
| Year of graduation of the highest degree, mean (SD), (min–max) | 2011 (7.64) (1986–2022) | 2010 (7.54) (1993–2022) | 2012 (7.19) (1988–2022) | 2009 (8.24) (1986–2022) | 0.094[a] |
| Pedagogical education (60 ECTS), n, % | | | | | 0.145[b] |
| Vocational teacher training | 69 (33.5) | 27 (42.2) | 25 (28.7) | 17 (30.9) | |
| Teacher training in health sciences | 103 (50.0) | 30 (46.9) | 50 (57.5) | 23 (41.8) | |
| Teacher training in educational sciences | 14 (6.8) | 4 (6.3) | 3 (3.4) | 7 (12.7) | |
| Under 60 ECTS pedagogical education completed | 15 (7.3) | 3 (4.7) | 6 (6.9) | 6 (10.9) | |
| No pedagogical education or ECTS completed | 5 (2.4) | 0 (0) | 3 (3.4) | 2 (3.6) | |
| Work experience in social and healthcare in years, n (%) | | | | | 0.968[a] |
| mean (SD), (min–max) | 16.18 (9.617) (0–42.5) | 16.29 (8.94) (0–42.50) | 16.27 (10.00) (0–40.75) | 15.89 (9.90) (1–40) | |
| *Missing data* | 2 (1) | 1 (1.6) | 0(0) | 1 (1.8) | |
| Work experience as an educator in years, n (%) | | | | | **0.002**[a] |
| mean (SD), (min–max) | 10.97 (9.20) (0–37) | 12.69 (8.72) (0.25–37) | 8.40 (7.52) (0–31.17) | 13.03 (11.14) (0–36) | |
| Current work organization, n (%) | | | | | 0.915[b] |
| University of applied sciences | 169 (82.0) | 52 (81.3) | 72 (82.8) | 45 (81.8) | |
| University | 34 (16.5) | 11 (5.4) | 13 (14.9) | 10 (18.2) | |
| Doesn't want to answer | 3 (1.5) | 1 (1.6) | 2 (2.3) | 0 | |
| Current job title, n (%) | | | | | 0.417[c] |
| Lecturer, university of applied sciences | 130 (63.1) | 40 (62.5) | 55 (63.2) | 35 (63.6) | |
| Principal lecturer, university of applied sciences | 7 (3.4) | 3 (4.7) | 1 (1.1) | 3 (5.5) | |
| Teacher, university of applied sciences | 25 (12.1) | 6 (9.4) | 15 (17.2) | 4 (7.3) | |
| Manager or leader | 4 (1.9) | 1 (1.6) | 2 (2.3) | 1 (1.8) | |
| University lecturer | 14 (6.8) | 7 (10.9) | 6 (6.9) | 1 (1.8) | |
| University teacher | 10 (4.9) | 2 (3.1) | 4 (4.6) | 4 (7.3) | |
| Professor | 8 (3.9) | 2 (3.1) | 2 (2.3) | 4 (7.3) | |
| Researcher | 8 (3.9) | 3 (4.7) | 2 (2.3) | 3 (5.5) | |
| Current teaching field, n (%) | | | | | 0.170[b] |
| Social, health, and rehabilitation | 160 (77.7) | 47 (73.4) | 71 (81.6) | 42 (76.4) | |
| Health science | 38 (18.4) | 12 (18.8) | 13 (14.9) | 13 (23.6) | |
| Leadership and entrepreneurship | 5 (2.4) | 3 (4.7) | 2 (2.3) | 0 (0) | |
| Different topics/fields | 2 (1.0) | 2 (3.1) | 0 (0) | 0 (0) | |
| *Missing data* | 1 (0.5) | 0 (0) | 1 (1.1) | 0 (0) | |
| In the last 2 years, participated in national conferences, continuing education, or research and development projects | | | | | 0.783[b] |
| Participated | 201 (97.6) | 63 (98.4) | 84 (96.6) | 54 (98.2) | |
| Did not participate | 5 (2.4) | 1 (1.6) | 3 (3.4) | 1 (1.8) | |
| Experience of hybrid teaching for the last 2 years (1 lesson 45 min), n (%) | | | | | 0.376[b] |
| Less than 5 lessons | 39 (18.9) | 9 (14.1) | 16 (18.4) | 14 (25.5) | |
| 5–10 lessons | 31 (15.0) | 9 (14.1) | 12 (13.8) | 10 (18.2) | |
| 10–20 lessons | 34 (16.5) | 7 (10.9) | 18 (20.7) | 9 (16.4) | |
| 20–30 lessons | 20 (9.7) | 6 (9.4) | 8 (9.2) | 6 (10.9) | |
| Over than 30 lessons | 82 (39.8) | 33 (51.6) | 33 (37.9) | 16 (29.1) | |

[a] One-way ANOVA.
[b] Chi-squared test.
[c] Fisher's exact test.

evaluated their planning and resourcing (mean = 3.06, SD = 0.85), technological competence (mean = 2.97, SD = 0.98), interaction competence (mean = 3.15, SD = 0.85), digital competence (mean = 2.78, SD = 0.91), and ethical competence (mean = 2.95, SD = 0.85) in hybrid teaching as moderate or good. These profiles significantly differed when comparing sum-variables with one another ($p < 0.001$) (see Table 2).

Educators in Profile A demonstrated very good and excellent levels (mean ranged from 3.80 to 4.07) of hybrid teaching competence. These educators rated their interaction competence in hybrid teaching the highest (mean = 4.07, SD = 0.44), while the digital pedagogical competence scored the lowest (mean = 3.80, SD = 0.52). Profile A educators rated their positive attitude towards hybrid teaching (scale 1 = negatively to 10 = very positively) as being well above average (mean = 7.30, SD = 2.57) (see Table 2).

Educators in Profile B showed moderate and good levels (mean ranging from 2.70 to 3.11) of hybrid teaching competence. These educators rated their interaction competence in hybrid teaching to be the highest (mean = 3.11, SD = 0.43), while the digital pedagogical competence scored the lowest (mean = 2.70, SD = 0.47). Profile B educators rated their positive attitude towards hybrid teaching (scale

**Table 2**
Educators' hybrid education competence and attitudes to hybrid education.

| Sum-variable of HybridEduCom, (Likert scale 1–5), mean (SD) | Total sample n = 206 | Profile A Advanced n = 64 (31.1%) | Profile B Good level n = 87 (42.2%) | Profile C Beginner n = 55 (26.7%) | p-value |
|---|---|---|---|---|---|
| Planning and resourcing in hybrid teaching | 3.06 (0.85) | 3.94 (0.55) | 3.01 (0.42) | 2.12 (0.52) | <0.001[a,b] |
| Technological competence in hybrid teaching | 2.97 (0.98) | 3.91 (0.63) | 2.98 (0.63) | 1.84 (0.48) | <0.001[a,b] |
| Interaction competence in hybrid teaching | 3.15 (0.85) | 4.07 (0.44) | 3.11 (0.43) | 2.15 (0.49) | <0.001[a,b] |
| Digital competence in hybrid teaching | 2.78 (0.91) | 3.80 (0.52) | 2.70 (0.47) | 1.77 (0.43) | <0.001[a,b] |
| Ethical competence in hybrid teaching | 2.95 (0.85) | 3.88 (0.50) | 2.86 (0.45) | 2.01 (0.45) | <0.001[a,b] |
| Educators rate how positive they are about hybrid teaching (grade from 1 = negatively to 10 = very positive) | 6.13 (2.69) | 7.30 (2.57) | 6.15 (2.43) | 4.73 (2.61) | <0.001[a,b] |

[a] Kruskal–Wallis test.
[b] Between profiles A–B, A–C, B–C

**Table 3**
Background factors related to 2 areas of educators' hybrid teaching competence (n = 206).

| Independent variable | Outcome variable | | | |
|---|---|---|---|---|
| | Planning and resourcing hybrid teaching (Low competence n = 50, high competence n = 154) | | Technological competence in hybrid teaching (Low competence n = 68, high competence n = 138) | |
| | OR (CI 95%) | p-value | OR (CI 95%) | p-value |
| Age in years | | | 0.95 (0.92–0.99) | **0.014** |
| Work experience in social and healthcare in years | 1.03 (1.00–1.07) | 0.052 | | |
| *Missing data n =2, 1 %* | | | | |
| Experience of hybrid teaching for the last 2 years (1 lesson 45 min) | | | | |
| Less than 5 lessons (*ref*) | | | | |
| 5–10 lessons | 1.22 (0.44–3.35) | 0.700 | 1.44 (0.54–3.84) | 0.461 |
| 10–20 lessons | 2.54 (0.87–7.73) | 0.100 | 1.33 (0.51–3.44 | 0.556 |
| 20–30 lessons | 0.84 (0.26–2.69) | 0.772 | 2.05 (0.64–6.58) | 0.225 |
| Over 30 lessons | 3.02 (1.23–7.38) | **0.015** | 3.59 (1.54–8.37) | **0.003** |
| Omnibus | | 0.021 | | 0.008 |
| Hosmer and Lemeshow | | 0.751 | | 0.830 |
| Cox & Snell, Nagelkerke R Square | 6.3%–9.4% | | 7.2%–10.1% | |
| Classification | 75.0% | | 67.5% | |

1 = negatively to 10 = very positively) slightly above average (mean = 6.15, SD = 2.43) (see Table 2).

Educators in Profile C showed a poor level (mean score ranged from 1.77 to 2.15) of hybrid teaching competence. These educators also rated their interaction competence in hybrid teaching as the highest (mean = 2.15, SD = 0.49), while they scored their digital pedagogical competence the lowest (mean = 1.77, SD = 0.43) (see Table 2). In addition, these educators rated their positive attitude towards hybrid teaching as medium (mean = 4.73, SD = 2.61) (see Table 2). In Profile C, work experience as an educator was significantly (p = 0.002) longer than that in Profiles A or B (see Table 1).

*Factors related to educators' hybrid education*

Binary logistic regression analysis predicted that the planning and resourcing of hybrid teaching was influenced by work experience in social and healthcare (OR = 1.03, 95% CI = 1.00–1.07, p = 0.052) and experience in hybrid teaching for more than 30 lessons in the last 2 years (OR = 3.02, 95% CI = 1.23–7.38, p = 0.015) (see Table 3). Educators with lower skills in planning and resourcing hybrid teaching had worked for 14 years in social and/or healthcare; those with higher skills had worked for 17 years in social and/or healthcare. Moreover, educators with more than 30 lessons of hybrid teaching experience had 3.02 times more competence in planning and resourcing for hybrid teaching than those with less than 5 lessons.

In addition, the technological competence of hybrid learning was influenced by age (OR = 0.95, 95% CI = 0.92–0.99, p = 0.014) and experience in hybrid teaching for more than 30 lessons in the last 2 years (OR = 3.598, 95% CI = 1.54–8.37, p = 0.003). Educators who were younger in age (mean age 48 years) had better technological skills as compared to those who had lower technological skills (mean age 51 years). Educators with more than 30 lessons of hybrid teaching experience had 3.59 times more competence in technological skills for hybrid teaching than those with less than 5 lessons. Moreover, the classification of the logistic regression model ranged from 67.5% to 75.0%.

## Discussion

The aim of this study was to describe and explain educators' competence with regard to hybrid education in social and healthcare higher education and the factors associating with this. In this study, we identified 3 different competence profiles (A, B, and C). Profile A demonstrated advanced competence, profile B good competence, and Profile C beginner competence. The results revealed that educators' competence in hybrid teaching was at a satisfactory level, and those who had advanced and good competence levels reported more positive attitudes towards hybrid education. Educators in all profiles rated interaction competence in hybrid teaching as the highest. In other words, the educators estimated that they can create an interactive learning environment in hybrid teaching that is characterized by an open and safe learning atmosphere. This finding is encouraging since all students, remote or face-to-face, would have an equal opportunity to interact with other students and educators in real-time (Lakhal et al., 2021).

Educators in all profiles rated their digital pedagogical competence as the weakest in hybrid teaching. Among educators, 27% (Profile C, beginner) rated their competence as low and 42% (Profile B, good level) rated their competence as satisfactory. Educators' digital

pedagogical competence in hybrid teaching includes the creation of digital teaching methods, the creation and use of digital learning materials, digital solutions to support student interaction, and the guidance needs of both remote and face-to-face students. This is concerning since educators' digital pedagogical competence plays a key role in the successful implementation of hybrid teaching. Mensonen et al. (2024) study showed that educators are required to have pedagogical competence in hybrid teaching to ensure interaction with students and to create a safe learning environment. Pajari et al. (2022) found that educators are unsure about using digital technologies in teaching, which may be due to a lack of resources and the necessary self-confidence to adopt digital methods. Another explanation might be experienced challenges in using digital pedagogy and creating digital materials. The participants in this study had different levels of initial education. It is possible that their digital pedagogical training was not included in their education at all (Ryhtä et al., 2020). Educators are motivated to develop their competences when they recognize their learning needs and also understand the benefits of professional development (Koskimäki et al., 2022). Almost all educators who participated in this study had participated in continuing education in the last 2 years.

According to Lakhal et al. (2021) successful hybrid teaching is influenced by the design of the course and learning events, which must consider the need to activate both groups equally and to ensure that they can interact in turns. Educators have found it challenging to design teaching methods for 2 student groups that need to be treated as one (Lakhal et al., 2021). In this study, ethical competence implied giving equal consideration of remote and face-to-face students, thereby valuing the participation of students and giving responsibility to students during the teaching process, for example by monitoring chat and taking responsibility for collaborative learning. The educators rated the ethical competence of hybrid teaching as moderate. Ethical competence may be weakened by the fact that educators have to consider 2 groups of students on an equal level. According to Zydney et al. (2019), to improve ethical competence, educators need to adjust instructional design and cannot assume that pedagogical practices used in traditional classrooms will work in hybrid teaching. The development of digitalization requires a change in pedagogical methods, and the use of technology in education requires more preparation and organization (Raes et al., 2020b).

Further, educators rated their planning and resourcing competence as good. The planning and resourcing of educators hybrid teaching competencies is influenced by educators' work experience in social and healthcare education and their experience of hybrid teaching through multiple lessons. This is understandable, as educators are confident in their own clinical skills (Mikkonen et al., 2018), it is easier for them to plan and provide resources for hybrid teaching in health science education. In addition, educators participate in continuing education by improving their knowledge of clinical skills (Koskimäki et al., 2022).

With regard to background factors and hybrid teaching competence, our study revealed that technological competence in hybrid teaching was higher among younger educators. Similarly, in previous studies, digital competence has been found to be higher among younger health educators (Pajari et al., 2022). Technological competence was influenced by educators' experience of hybrid teaching of multiple lessons. Technological competence in hybrid teaching entails the use of different teaching methods and student participation in the learning process, but challenges have been identified in the functionality of the technology and the skills to use it (Lakhal et al., 2021). In hybrid teaching, technological competence requires instructors to master using the necessary equipment (such as cameras, speakers and headsets). They need to know how to use these tools to enable collaborative work. The results of this study suggest that older educators could benefit from additional technology-related training. In addition, appropriate hybrid learning facilities and support are required to make the technology work through in-service training (Lakhal et al., 2021.) Not all organizations may have the facilities and technology for hybrid teaching. Educators have been concerned with regard to equality in the use of digital technology—that is, whether everyone has access to the necessary equipment and competency (Ryhtä et al., 2020). It was surprising that among the background factors, work experience as an educator did not influence any of the competencies in hybrid teaching. This is probably because hybrid teaching requires a rather new competence, which is why work experience as an educator does not bring any additional advantage.

### *Limitations and strengths*

This study has a few limitations. First, the response rate for the survey was 12.19%, which can be interpreted as low. The low response rate may be explained by the fact that hybrid education is a relatively new teaching method in the social, healthcare, and health science fields. Second, the participants represent a national sample from Finland. The low response rate and the representativeness of the sample must be taken into consideration when generalizing the results of this study. The instrument is a self-evaluation of educators' own competencies, which might add subjectivity to results. The effect size of Cohen d among the profiles varied from large to very large (1.94–3.39), thereby indicating that the size of the sample was adequate. The strength of our study is the use of the epidemiological observational reporting of surveys (STROBE) list (Von Elm et al., 2007). Another strength of the study is the analytical approach in a person-centered way (cluster analysis), which helped to identify different competence profiles. The results of these profiles can be used to assess personal continuing training needs or to plan continuous learning in the workplace.

## Conclusion

This study revealed that social, healthcare, and health sciences educators are competent in planning and developing resources for hybrid teaching, which is influenced by work experience in social and healthcare education and previous experiences in hybrid teaching. In particular, educators require support in digital pedagogical competence and ethical competence in hybrid education. The educators' technology competence in hybrid education was stronger among younger educators and was also influenced by their experience of hybrid teaching through several lessons. Hybrid education has become easier over the last decade, as digital technology has become more accessible and online materials are more readily available. However, hybrid education requires investment to improve teaching, but it can save resources and improve teaching in the future. The successful adoption of new technologies in health education requires appropriate institutional features, such as a supportive culture, access to educational technology, and the provision of continuous education for educators. In the future, continuous education in hybrid teaching should focus on improving digital pedagogical competence, and instead of self-assessment, peer evaluation should be taken into consideration, for example, to provide a more objective and comprehensive assessment of educators' hybrid teaching competence.

## Conflict of Interest

No conflict of interest has been declared by the authors.

## Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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## Author contributions

The conception and design of study: RJ, SPS, HMK, KM; acquisition of data: RJ, HJ; analysis of the data: RJ, KM; interpretation of data: RJ, SPS, HMK, KM; drafting and commenting the article: RJ, SPS, HMK, HJ, JJ, MK, TT, KM.

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