KARELIA UNIVERSITY OF APPLIED SCIENCES

Master in Active Ageing: Development and Management

Outi Sulopuisto

REVERSE MENTORING as continuing professional development in higher education

Recommendation for action based on current evidence

Master's Thesis

November 2020

Contents

	THESIS **November 2020** **Master's Programme in Active Ageing** Tikkarinne 9 80200 JOENSUU FINLAND + 358 13 260 600 (switchboard)

Author
Outi Sulopuisto

Title
REVERSE MENTORING as continuing professional development in higher education Commissioned by Carinthia University of Applied Sciences Didactic Centre

Abstract
This Master's thesis addresses the topic of continuing professional development of the teaching staff of higher education institutions by the means of reverse mentoring regarding the topic of digital skills in teaching. The topic of online teaching is not a new one, yet its immediate implementation became evident during the COVID-19 pandemic in 2020. Reverse mentoring is a developmental relationship, where the traditional roles of an older mentor and younger mentee are being reversed. In the case of teacher professional development, the students take the role of the mentors and teachers that of the mentees. The research questions addressed the benefits reverse mentoring might entail for the mentees and what the essential components of a successful reverse mentoring program from the organizational point of view are. The research was conducted using the mixed methods systematic review according to Joanna Briggs Institute revealed several benefits for the teacher mentee. The findings of the review included three synthesized findings both for the benefits for the teacher mentees and the essential components of a successful reverse mentoring program. This Master's thesis concludes to consider reverse mentoring as a potential method of teacher professional education in the field of digital skills and presents recommendations for a reverse mentoring program at a higher education institution. Further empirical studies in reverse mentoring as professional development strategy for teachers in higher education are recommended.

Language	Pages 62
English	Appendices 4 Pages of Appendices 7

1   Introduction

Ageing with its implications to our societies has been on the international agenda for almost 40 years (World Health Organization 2002). One of the implications of the demographic change is the increase of number of people aged 50+ at work (Staudinger & Bowen 2011, 295). The EU has promoted life-long learning as one of its seminal policies already since the 1990s (European Commission 1995). However, there is evidence that older workers are offered less possibilities for further training and professional development (EU-OSHA, Cedefop, Eurofund & EIGE 2017, 52; Gosling 2011, 4). Both individual and organisational factors are seen to contribute to this matter (Raemdonck et al. 2015, 164; Staudinger & Bowen 2011, 302).

In the first section (chapter 2), this Master's thesis explores the concept of older workers, shortly introduces two fundamental theories of adult learning and looks at older workers as learners, discusses the implications of digital transformation to continuing professional development of the teaching staff of higher education institutions (HEIs) and concludes by presenting reverse mentoring as a possibility of continuing professional development. Reverse mentoring seems to be widespread in the corporate world (Murphy 2012, 550), but despite its potential for continuing professional development it has not been established in higher education institutions (Morris 2017, 287).

The second section after presenting the purpose, aims and tasks of the thesis (chapter 3), is devoted to the methodological choices and results of the mixed methods systematic review (MMSR) in accordance with the Joanna Briggs Institute (JBI) (chapters 4 and 5). The findings of the review are presented for each research question in separate chapters and can be also found in Appendices 3 and 4 at the end of the thesis. The last section (chapter 6) of the thesis discusses the results, makes recommendations with some considerations, addresses the reliability and ethics of the thesis and finally makes suggestions for further research.

The topic of this thesis is relevant due to the implications of digital transformation in education and especially timely due to the additional pressure towards online teaching owing to the COVID-19 pandemic. It is to be expected that further effort to establish

sustainable usage of digital tools and to continually update digital skills in HEI instruction is necessary. Reverse mentoring may be one of the approaches to achieve this goal.

2   Knowledge Base

2.1   Older workers

Defining the concept of an "older worker" using chronological age as the sole parameter captures only a narrow picture of the whole (Cleveland & Lim 2007, 110; Pitt-Catsouphes, Matz-Costa & Brown 2011, 82). This is not to say chronological age should be disregarded, but that by using it solely its explanatory power is limited. This is due to the fact, that parallel to the predictable changes that ageing brings with it, individual differences can be considerable. (Cleveland & Hanscom 2017, 27–28.) Additionally, an Irish survey conducted among managers and supervisors revealed how varied the perceptions of the chronological age of an "older worker" alone could be: they ranged from 28 to 78 years, with median of 55 years (McCarthy, Heraty, Cross & Cleveland 2014, 381). This further illuminates the necessity of taking additional aspects of being an older worker into consideration (Cleveland & Hanscom 2017, 39).

Widely cited in the work literature, Sterns and Doverspike's (1989) multidimensional definition of age includes functional, psychosocial, organisational and life-span age in addition to chronological age. Functional age deals with performance at work in relation to both physical and mental changes with chronological age. Psychosocial age includes both personal and the environment's perception of an individual's age and appropriate behaviour. Organisational age refers to the time an employee has spent in the organisation or with a specific task. Finally, life-span point of view takes into consideration different variables, which shape the life course of a person making it unique. (Cleveland & Hanscom 2017, 30; Urick 2017, 48.) It should be noted that all these aspects are intertwined, which is exemplified in the connotations of work-related labels such as "newbie" or "old-timer". Not only do the words refer to chronological age, but with them come assumptions about the other age dimensions as well. (Urick 2017, 52.) These five dimensions locate either in the individual, in the environment or in their interaction

(Schalk, van Veldhoven, de Lange, de Witte, Kraus, Stamov-Roßnagel, Tordera, van der Heijden, Zappalà, Bal, Bertrand, Claes, Crego, Dorenbosch, de Jonge, Desmette, Gellert, Hansez, Iller, Kooij, Kuipers, Linkola, van den Broeck, van der Schoot & Zacher 2010, 79).

A more recent example of trying to grasp the different dimensions of the concept "older worker" includes the Prism of Age developed at the Sloan Center for Work. This conceptual framework builds on the work of Stern and Doverspike, among others. (Cleveland & Hanscom 2012, 31.) The Prism of Age looks at ageing from ten different aspects ("lenses") and seeks to support managers is designing differentiated and appropriate age management responses (Pitt-Catsouphes et al. 2011, 84–90). There are further elaborations of the Prism of Age such as the Matrix of Age (Finkelstein, Heneghan, Jenkins, McCausland & Siemieniec, in progress) and Age Cube of Work (Segers, Inceoglu & Finkelstein 2014). All three conceptualisations of age are examples of approaching age in a multidimensional way, but their wider practical application is still missing. (Cleveland & Hanscom 2017, 32.)

Yet another starting point for conceptualising ageing is self-perception, which leads to subjective age measures (Cleveland & Hanscom 2017, 33–34). One example of this is the Ageing Perception Questionnaire (APQ), which is based on the self-regulation model by Leventhal (1984). "A key assumption of this model is that an individual forms a representation of their health threat or illness that can be divided into a series of logical themes or dimensions". In APQ these dimensions are identity, timeline, consequences, control and emotional representations. Identity addresses the perceived connection between age and changes in health. Timeline looks at whether a person perceives herself old all the time or periodically. Consequences refers to the belief about whether ageing brings positive or negative effects with it. Control deals with beliefs about one's influence over both positive and negative changes that come with ageing. Lastly, emotional representations address the emotional echo connected with becoming older. The authors highlight the importance of taking self-perception into account, since it can influence an individual's health positively or negatively. (Barker, O'Hanlon, McGee, Hickey & Conroy 2007.) Additionally, there are further conceptualisation of age, which place self-perception as their starting point, such as Awareness of Age by Diehl & Wahl (2010).

Also, according to Urick (2017, 47) age identity is a topic worth looking more into. However, this work will not address these concepts further.

To this day there is still not one established definition of an older worker (Cleveland & Hanscom 2017, 20). In the future it is important to keep developing conceptualisations and measures, which have predictive power in terms of health outcomes and well-being in the context of work. As stated earlier, this requires approaching the concept of ageing workers from several dimensions. (Cleveland & Hanscom 2017, 39.) These health-centred conceptualisations are pertinent to learning as well, since certain health conditions can influence learning negatively (Merriam, Caffarella & Baumgartner 2007, 432). Due to practicality, in this Master's thesis older workers were considered to be 55–64 years old, following Eurostat's (2019) definition.

One of the implications of the demographic change is the increase of number of people aged 50+ at work (Staudinger & Bowen 2011, 295). The EU-28 average employment rate in the 55–64 age group is 58.7% (Eurostat 2019). The topic of older workers has received attention since the 1980's. However, it has seen its emphasis shift from seeing ageing workforce as a challenge, through emphasizing the strengths of older workers, and as one of the dimensions of diversity. Moreover, the present approach is to consider everyone's needs, regardless of which age group they belong to. (Wallin 2014, 8).

Nowadays age management is a key concept in addressing the dimension of age at work. It "refers to the management of human resources with an explicit focus on the requirements of an ageing workforce. Age management is holistic, intergenerational and life-course oriented." (EU-OSHA 2016a.) The eight elements of age management are depicted in the Figure 1 and summarized in the text starting with 'job recruitment' moving on in clockwise order.
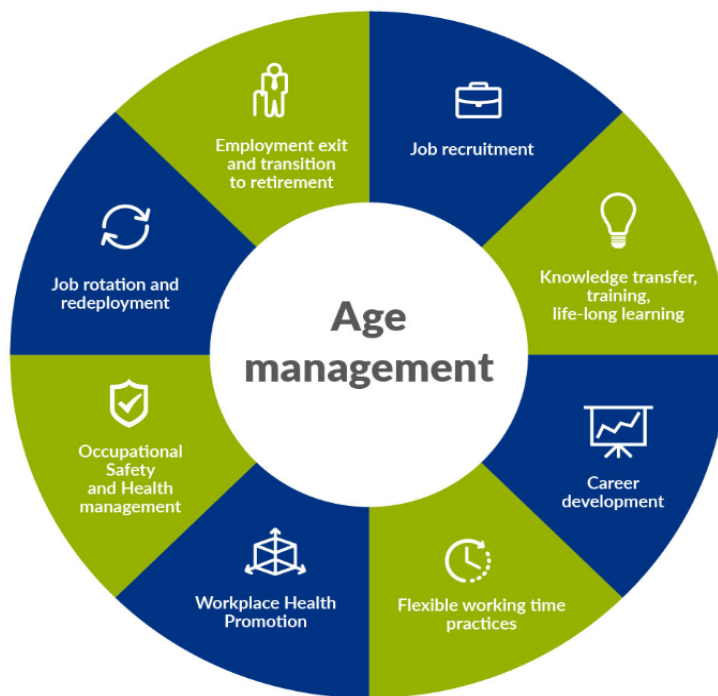
Figure 1. The elements of age management. Adopted from EU-OSHA 2016a.

Taking age into consideration in job recruitment means resigning from age discrimination and seeing the potential assets experienced employees bring to the workplace. Having an age diverse workforce can contribute to the success of the company, since it has a larger talent and knowledge pool at its use, and it can adapt faster to rapid changes in the market. (EU-OSHA 2016b.) However, reaching the potential success requires adequate management (Buttigieg 2011, 7).

Knowledge transfer, training and life-long learning highlight the necessity of keeping up with the constant changes in the work organisation and valuing implicit knowledge gathered by the older workers. It encompasses both formal and informal learning. Good practices include mapping everyone's training needs, making sure they are aligned with career development plans, promoting an atmosphere supportive of learning and adapting to the different learning styles and motivations the different generations may have. Traditional mentoring is mentioned as one possibility for knowledge transfer. (EU-OSHA 2016c.)

Career development includes promotion, redeployment and in general including older workers in discussions about their career paths and goals. It is closely connected to

professional development. Career development is especially important in physically and mentally strenuous jobs, which cannot be performed all the way through to retirement. Regardless of the job description, in an optimal situation, employees' job descriptions match their experience and knowledge. 'Job rotation and redeployment' can be seen as a job design technique, but it can be linked with career development. (EU-OSHA 2016b.)

Flexible working time practices can play an important role in finding work-life balance in any age. Many older workers have care responsibilities or personal health issues to attend to, which can be difficult to coordinate without flexibility in work time arrangements. The phase of 'employment exit and transition to retirement' is also an individual process. It should be part of career planning and the employer should offer support in planning the shift to retirement. (EU-OSHA 2016d.)

Workplace health promotion is the "combined efforts of employers, employees and society to improve the health and well-being of people at work" (EU-OSHA 2016e). It addresses both the role of the working environment, the individual worker and the importance of participation as contributors to health. Nowadays workplace health promotion and occupational safety and health management are seen to be integrated into each other, rather than as two separate subjects. (EU-OSHA 2016e.)

Reverse mentoring, the topic of this thesis, can be categorized under the theme *knowledge transfer, training and life-long learning*. The other elements of age management are beyond the scope of this thesis and will not be addressed further in this report. That is also why only a short summary was presented here.

There is some evidence that older workers are offered less possibilities for further training/professional development (Davies et al. 2017, 185; EU-OSHA & al. 2017, 52; Gosling 2011, 4). Older workers also participate less, which might have to do with the fact that the trainings are poorly designed to match their learning style (Raemdonck, Beausaert, Fröhlich, Kochoian & Meurant 2015, 175). However, due to the decrease of the new work force entering the labour market, employers have a very good reason to ensure that older workers stay skilled as well (Raemdonck et al. 2015, 163).

Zupančič (2016, 33–36) points out that older knowledge workers are important to the European economy in general and that they have received too little attention compared to the low-skilled and unemployed. Referring to Zupančič (2016), among (older) workers the older knowledge workers are the most productive and without them there would be much less innovation. This Master's thesis regards higher education teachers as knowledge workers.

This section reviewed the definition of 'older worker' and came to the conclusion that no established definition exists, yet it is important to pay attention to age in working life. Age management was presented as the general framework to address age-related considerations without going into more detailed discussion of its elements. The next section looks at older workers from the point of view of adult learning.

2.2   Older workers as learners

People are capable of learning all through their lives (Staudinger & Bowen 2011, 296). Different adult learning theories have been developed to grasp the essential features of adult learning in distinction to children's learning, in other words pedagogy. In the following a short introduction to andragogy and self-directed learning will be provided, since these conceptualizations are considered fundamental to the study of adult learning. (Merriam & Baumgartner 2020, 87.)

In its beginning, Knowles (1980) postulated that andragogy, or adult learning, is characterized by self-directedness, using life-experiences as a resource, being problem-centered and learning needs being related to changing social roles. Later Knowles (1984) added that adult learners are motivated by internal rather than external factors and that they need to understand the rationale behind learning. However, the correctness of these assumptions has been questioned several times pointing out that none of the characteristics applies absolutely only to adults and to all adults. (Merriam & Baumgartner 2020, 90–92.) Ross-Gordon, Rose & Kasworm (2017, 220) came to the conclusion that depending on the situation, Knowles' descriptions are more or less suited to characterize adult learners. This brings us close to a further critique point, which is the lack of consideration for contextual factors in adult learning. Here andragogy clearly

leaves an important aspect, which shapes learning, unaddressed. (Merriam & Baumgartner 2020, 94.) Despite the critique, the six characteristics are widely applied and andragogy "constitutes a major component of [---] adult learning" (Merriam & Baumgartner 2020, 97–98).

Self-directed learning concept (SDL) was born around the same time as andragogy, in the late sixties (Merriam 2001, 8). It refers to learning, which is self-directed in all of its phases from recognizing one's learning needs to assessing one's learning outcomes. Most of this learning takes place outside of formal institutions. SDL considers the goals of adult learning to be "the development the learner's capacity to be self-directed", fostering transformational learning which requires critical reflection and the promotion of "emancipatory learning and social action as an integral part of SDL". (Merriam & Baumgartner 2020, 107.) The several process models that have been developed to answer the question of how self-directed learning takes place can be divided in to three categories: linear, interactive and instructional. The instructional models have been developed to address SDL in formal educational settings and how teachers can support their students to become self-directed learners. (Merriam & Baumgartner 2020, 109–115.) This could be pertinent to reverse mentoring relationships, as well. Merriam and Baumgartner (2020, 122) also point out that SDL has gained interest in working life in the field of human resource development.

Despite the lack of a fully developed theory and varying definitions, there are differences in how older and younger people learn. Therefore, age needs to be taken into consideration in order to support learning in the best possible way (Davies et al. 2017, 191; Kogovsek & Kogovsek 2013, 2283; Ropes 2014, 8; Ropes 2013, 715). However, the perspective of chronological age is informative only in some ways since learning has shown to be a very individual issue. Seeing older people as one homogenous group has not been very useful because our life course shapes us in different ways. (Davies, Hanley, Jenkins & Chan 2017, 185, 191–192; Gosling 2011, 4; Raemdonck et al. 2015, 168; Schulz & Roßnagel 2010, 396; Staudinger & Bowen 2011, 297.) For example, more than the chronological age, remaining opportunities at work, learning self-efficacy and work centrality seem to predict how important training and further development are considered (Meurant & Raemdonck 2014, according to Raemdonck et al. 2015, 170).

According to Baltes and Baltes' (1990) selection, optimization and compensation model ageing is a process of gains and losses. By selecting an appropriate goal, optimizing the resources at use for achieving it and compensating for losses, it is possible to keep a desired functional level. (Baltes, Rudolf & Bal 2012.) This can be applied to learning and achieving learning goals as well (Raemdonck et al. 2015, 173). Both internal and external factors influence learning and are closely intertwined (Staudinger & Bowen 2011, 302). Internal factors refer to the physiology and psychology of an individual whereas the external factors are a "complex system of interrelated circumstances" (Bronfenbrenner 1979 as cited in Staudinger & Bowen 2011, 297). According to Raemdonck and others (2015, 169) the two most commonly researched topics regarding individual factors of learning are the capacity to learn and learning motivation. In addition, older people vary in their confidence as learners, which can be influenced by their previous experiences (Davies et al. 2017, 193). The following paragraphs will take a closer look at capacity to learn and learning motivation.

One aspect of learning capacity are the cognitive and sensorial changes related to ageing. For example, decline in fluid intelligence and as part of it decline in memory are normal cognitive changes attributed to ageing. (Harada, Natelson Love & Triebel 2014). However, to use the age-related cognitive changes as an argument not to offer training to older workers seems to be an unfounded conclusion (Davies et al 2017, 191; Raemdonck et al. 2015, 172), ignoring that learning at work usually requires more than only memorizing pieces of information (Raemdonck et al. 2015, 173).

Motivational theories try to explain why older workers may be less motivated, but also argue why older learners stay motivated. Reduced motivation might be connected to the change in the perspective of time when a person gets older: why put a lot of effort into something, which brings relatively little effect? On the other hand, people usually stay interested in the same things throughout their life, which would imply that their motivation does not diminish. (Raemdonck et al. 2015, 170–171.) Older workers are said to be motivated by self-actualization in contrast to younger colleagues, who are driven by career-related reasons (Kanfer & Ackermann 2007 cited in Ropes 2014, 8).

Kogovsek and Kogovsek (2013, 2286) state that "knowledge workers are strongly motivated to participate in learning". However, they do not provide any empirical

evidence to support their claim. The reasons to learn can be divided into two types: instrumental and intrinsic. In the first case learning is a means to an end and in the latter it is valuable in itself. (Schulz & Roßnagel 2017, 384.) Compared to their younger colleagues, older workers' reasons to participate in professional development lie less in acquiring new competences and more in sharing what they have learned. In general, their drivers can be labelled under self-fulfillment. (Ropes 2013, 722.) Kanfer and Ackermann (2004, 453) have put forth the idea that older workers are more interested in learning tasks where they can use their crystallized intelligence, since it is cognitively less strenuous than using fluid intelligence. In addition to intrinsic factors, financial safety has gained in importance due to the rising retirement age (Davies et al. 2017, 190).

As for the preferred learning style, older workers prefer learning embedded in authentic context (Wognum & Horstink 2010 according to Ropes 2015, 16; Ropes 2013, 723; Zwick 2012, 11). Davies and others (2017, 191) point out that it might be beneficial to frame the learning content as strengthening the existing skills instead of filling deficits. Analysing a large German data sample based on interviews in 2007 and 2007 Zwick (2012, 11) found out that training of older workers is less efficient, but this is probably due to wrong type of training. This clearly emphasizes the necessity of taking age into consideration when planning training and learning activities at work.

As for the external/environmental factors, the organizational climate towards older workers is relevant. One of the organizational barriers is negative stereotypes attached to older age. (Davies et al. 2017, 185; Gosling 2011, 4; Raemdonck et al. 2015, 164; Staudinger & Bowen 2011, 302.) Negative stereotypes such as seeing older workers as less motivated or slower in accomplishing tasks, might influence their learning (Raemdonck et al. 2015, 175).

Despite inconsistent empirical evidence, older workers are being seen stereotypically as less adaptable and possessing knowledge that is out-of-date (Raemdonck et al. 2015, 174–175). It is important to keep in mind that in the future older workers will form a large part of the available work force and therefore their training cannot be ignored (Raemdonck et al. 2015, 163). Raemdonck and others (2015, 176) call for more attention to older workers' learning needs, interests and motivation. Hansman (2016, 34) suggests that formal

mentoring as continuing professional development could be used to promote individual learning goals.

From an organizational point of view, single measures of professional development are more sustainable when embedded in a strategy or in the organizational culture. A 'learning organisation' by Senge (1990) is an example of this. The idea is that an environment supportive of learning in general lessens the barriers and resistance individuals may have towards training, because appreciating the various ways learning takes place and the various learning needs the employees have leads to finding individual solutions. The opposite, offering an obligatory one-size-fits-all training, might be seen as a form of control. (Davies et al. 2017, 195–196.)

The necessary skills and competences for a given job are irrespective of age (Davies et al. 2017, 185). According to Ropes (2013, 721) older workers might find it hard to motivate themselves for formal training since it does not take their learning styles and motivations into consideration. Gosling (2011, 4) points out that good learning design for older workers is usually good learning design for all. Moreover, the benefits of professional development extend beyond the workplace as the learning serves the non-work-realm as well (Gosling 2011, 4; Redecker & Punie 2017, 12).

This section started with a short look at two influential adult learning theories before moving on to issues influencing older workers' learning, namely learning capacity, learning motivation and the role of the environment. Within all of these topics, characteristics for older people's learning at work were identified. For example, it was suggested that older workers prefer learning in embedded context. This would fit well with reverse mentoring.

2.3 Implications of digital transformation to continuing professional development of higher education institutions' teaching staff

Higher education institutions cannot avoid being influenced by digital transformation any less than other fields of work (Brown, McCormack, Reeves, Brooks & Grajek 2020, 5). At least three arguments are being brought forward as to why higher education needs to

fully embrace digital technologies. First, students belonging to the "Digital natives" are said to learn differently from the previous generations due to having grown up with digital technologies (Ramlee & Kashefian-Naeeini 2017, 27). Second, new technologies can transform teaching and learning (Conole 2014, 230). Third, higher education has a responsibility in equipping students with adequate digital competences for the future labour market as well as civil life (Redecker 2017, 15). However, the adoption and integration of information and communication technology (ICT) in higher education is still in process (Bond, Marín, Dolch, Bedenlier & Zawacki-Richter 2018; Conole 2014, 228). Very recently, the Covid-19 pandemic forced many educational institutions to mobilize their digital teaching possibilities (OECD 2020). One aspect of being able to implement digital teaching is to have a teaching staff competent with pertinent technologies.

A closer look at the first claim made about the present student generation being automatically tech-savvy does not hold critique very well. Having grown up in a digitalized world does not automatically lead to being competent with technologies. (Redecker 2017, 12; Smith 2012, 7.) According to Smith (2012, 4–7), many authors have purported the idea of the generation born in the 1980's and 1990's to be technologically more savvy and that this would be reflected in the ways this generation wants to learn in HEIs. This would call for the faculty to adapt their teaching methods, for example by incorporating more technology. Based on a review of the most cited publications purporting the idea of "digital natives" being special due to having grown up surrounded by digital technology, Smith (2012, 5–7) recognizes "eight dominant digital native claims": 1) possessing new ways of knowing and being, 2) driving a digital revolution transforming society, 3) innately or inherently being tech-savvy, 4) multi-taskers, team-oriented and collaborative, 5) native speakers of the language of technologies, 6) embracing gaming, interaction, simulation, 7) demanding immediate gratification and 8) reflecting and responding to knowledge economy.

Bennett, Maton and Kervin (2008, 783) have criticized these claims to have very little theoretical or empirical support. Despite this critique, the digital native discourse is still influential in the field of higher education, especially when it comes to educational technology. Several authors have considered the labelling of a certain generation as tech-savvy too simplistic and call for a view to better reflect the complexities of the issue.

Paying attention only to age ignores other important factors such as web access or socio-economic status. (Smith 2012, 7–9.) Smith (2012, 14) advocates a shift away from the binary "digital natives/digital immigrants" towards richer typologies which would echo the diversity of the learners in higher education.

The second argument about the transformational potential of digital technologies has its proponents and critics. To give a few examples, Conole (2014, 230) sees the technologies facilitating a shift towards more learner-centred teaching and learning. She sees especially the Internet as enabling many different ways of communicating and networking. Pandey (2019, 2) emphasizes the meaning of mobile technology as a changemaker for higher education, since it allows the user to decide the location and time of studying.

On the other hand, Castañeda and Selwyn (2018) have listed several points of criticism about educational technology, which call for more discussion and development. First of all, they consider the present digital learning theories and concepts weak and their pedagogical foundations unclear. Related to the conceptual difference between 'education', which is more than mere 'learning', the emotional and affective aspects of studying with technology should be addressed more. They also point out how in their opinion individualisation of learning may have an opposite side to it as well: not everyone is a skilled autodidactic and the least to be done would be to discuss the matter more openly. Connected with individualisation the authors address commercialisation and how digital technologies for learning and teaching have become a big business and the companies behind the products influential. Individualisation and commercialisation can also be seen to fit well with the neo-liberalist values, which reframe higher education as one more product on the market. (Castañeda and Selwyn 2018.)

The third argument about equipping students for their future in working life and as citizens seems undisputable. "It is essential to adequately prepare citizens for an increasingly interconnected, globalised future by investing in the skills and competences required to thrive and positively engage in society in the digital age" (European Commission 2020).

The implications of digital transformation to teaching and learning as well as to research require faculty development (Kukulska-Hulme 2012; Ng 2015, 25), which falls into the

realm of adult education (Peterson 2012, 25). The challenge is two-fold: first, the faculty's attitude towards professional development might not be very enthusiastic, especially if they do not see a benefit for themselves. Second, financial resources are scarce. (Kukulska-Hulme 2012.) The results of a longitudinal study at a Swedish university showed that more experienced teachers presented the least amount of change of their "conception of and approaches to teaching." They stayed teacher-centered instead of becoming more learner-centered. The authors see more support necessary in order to these educators for change their understanding. (Englund, Olofsson & Price 2016, 12.)

Beach, Sorcinelli, Austin, and Rivard (2016) (cited by Bali & Caines 2018, 2) have pointed out that continuing professional development/ faculty development usually fails to take the whole person into account and instead just concentrates on the features considered useful for the job. When considering the students, the courses are designed in a learner-centred way, but when it comes to educational development, often this is not the case. Among Ng's (2015, 28–31) list of characteristics of effective teacher professional development, he points out the importance of focusing on the learners and their individuality, such as the needs and prior knowledge. The implementation should also be practical, include collaborative problem-solving and last long enough.

The European Framework for Digital Competence of Educators (DigCompEdu) presents educator-specific digital competences, which can be applied to each education level. They comprise of 22 elementary competences divided into six areas, which are 1) professional engagement, 2) digital resources, 3) teaching and learning, 4) assessment, 5) empowering learners and 6) facilitating learners' digital competence. (Redecker & Punie 2017, 9.) Figure 2 shows the DigCompEdu framework.
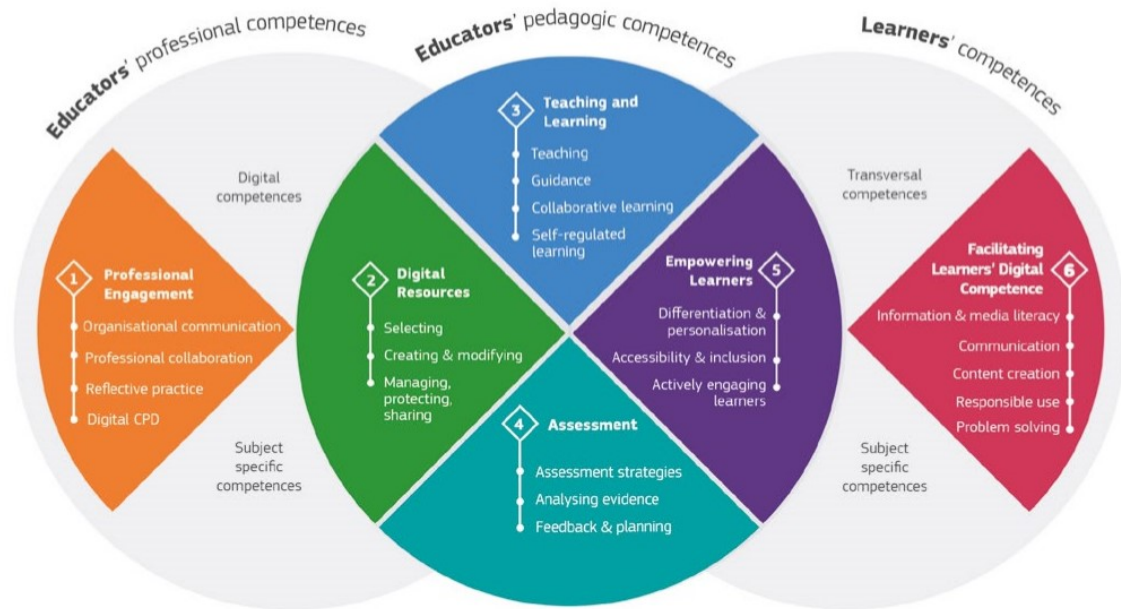
Figure 2. European Framework of Digital Competences for Educators. Adopted from Redecker & Punie 2017, 19.

The first area, 'Professional Engagement', deals with using digital technologies in communicating and collaborating with the different networks related to the actual work with students. These include the educational organisation, the colleagues, the parents and further relevant third parties. It also covers reflecting both personal and organisational competence level of digital pedagogy and using ICT for continuing professional development. (Redecker & Punie 2017, 19.)

The second area, 'Digital Resources', refers to the skills needed for selecting, modifying, and creating digital teaching and learning materials. A part of using existing or created material is to know how to manage, protect and share it. One side of the coin is knowing how to make created materials available to others. The other side is taking privacy issues and copyright into consideration and understanding what rules apply to open educational resources. (Redecker & Punie 2017, 20.)

The third area, 'Teaching and Learning' is the core in the framework, since it takes into account designing, planning and implementation the learning process. The greatest potential of digital technologies is seen in making this process learner centred, which also

changes the role of the teachers. Their task becomes to offer guidance and to foster both collaborative and self-regulated learning. (Redecker & Punie 2017, 20–21.)

The fourth area, 'Assessment' refers both to students and teachers themselves. The first aspect is that digital technologies can augment the traditional formative and summative assessment and offer additional possibilities. Second, using digital technologies creates a large data pool, which need to be managed wisely in order to benefit teaching and learning. Third, in addition to giving feedback to students, the teachers themselves can collect feedback about their teaching in order to adapt their future pedagogical choices. (Redecker & Punie 2017, 21.)

The fifth area, 'Empowering learners' highlights the learner-centred and differentiated learning possibilities offered by digital technologies. This means creating learning situations, which encourage an active and creative role of the learner to tackle complex subject matters. Additionally, digital technologies can be the key to better accessibility and inclusion of learners, yet simultaneously they might pose a barrier to participation. The reasons for this can be found in skill level mismatches and personal and contextual constraints. Ensuring that the utilization of digital technologies promote inclusion requires careful consideration. (Redecker & Punie 2017, 22.)

Lastly, the sixth area, 'Facilitating Learners' Digital Competences' is aligned with the European Digital Competence Framework for Citizens but considered from a pedagogical point of view. All the five competences are thought to be incorporated into the process of learning, including assessment. The skill to facilitate learners' digital competences is seen as an important part of educators' digital competence. (Redecker & Punie 2017, 23.) All in all, the framework clearly shows how digital competence is much more than the ability to use a certain technology (Redecker & Punie 2017, 17).

Referring to several papers, Mercader & Gairin (2020) summarize that university teachers make use of educational technology mostly in form of presentational applications and learning platforms, using much less technology which would put the learner in the centre. A survey conducted in a public Vietnamese university indicated a correlation between a positive attitude and level of technology integration in teaching and learning. The study also showed the faculty members do not use the technologies to their full potential, even

though they recognize it. (Hue & Jalil 2013, 62.) A similar result was found in a study conducted at a German university, which addressed teacher and student perceptions and the usage of digital media in teaching and learning. Interestingly, the study also revealed certain disparities between students and teachers. For example, the majority of the teachers did not consider lecture recordings useful, which is the opposite view of the majority of the students. (Bond et al., 2017.)

Based on the analysis of seven other papers on the typologies of barriers for integrating digital technologies, Mercader and Gairin (2020) propose four different categories for the barriers of integration of digital technology: individual, professional, institutional and contextual as well as resistance to change. The results of their multiple case study fitted well into the division and showed the prevalence of professional obstacles. This result points to the importance of teachers' professional development as a way to address the barriers. When it comes to the relationship between integration of digital technologies in the teaching and academic discipline, the evidence is inconclusive. Age was not a variable in this study, but it could be looked into in future research. (Mercader & Gairin 2020).

One particular aspect of digital technologies, namely social media, is seen to have potential for higher educational institutions, but it has not been taken advantage of fully (Manca & Ranieri 2016, 63; Manca & Ranieri 2017). Referring to Cuban 2001, this has little to do with being technophopic because the scholars use it for their research – it was rather the belief and attitudes that stopped them from using social media for teaching (Manca & Ranieri 2016, 63).

According to Manca and Ranieri (2016, 64) Moran and others (2012) found out that among the faculty members older age corresponded to using social media less. In their own survey, Manca and Ranieri (2016, 65) considered three purposes of social media usage: personal (connect with family and friends), professional (connecting with colleagues, staying up to date etc.) and teaching. Their results revealed that HEI teachers aged 55+ used some of the social media applications included in the survey (e.g. Twitter, Facebook, Youtube/Vimeo) less than their younger colleagues in all three above mentioned domains and that this association was significant (Manca & Ranieri 2016, 67). However, at the same time teachers with more years of experience use social media in their teaching more than colleagues with less experience (Manca & Ranieri 2016, 70).

Manca and Ranieri's (2016, 70) results point to the direction of HEI's teaching staff using social media less for teaching than for private and professional purposes in general.

The previous chapter explored the implications of digital transformation to higher education and especially to its teaching staff regarding their technological skills. The DigCompEdu framework was introduced in order to give an impression of the various aspects of digital competence. Three main arguments for higher education institutions needing to take digital technologies seriously in teaching and learning were presented as well as the teachers' readiness to implement them. Older teachers were addressed as far as the literature allowed to make a chronological distinction. Social media as a pedagogic tool was addressed since social media as topic is often connected with reverse mentoring, at which the next chapter will have a look at.

2.4   Reverse mentoring

Mentoring is probably one of the oldest ways of teaching, learning and professional and personal development. According to the Greek story, Mentor was the person to look after Odysseus's son while he was on his journeys. The present-day mentoring has arrived in Europe from the United States, which in turn was inspired by mentoring in Japan. (Kupias & Salo 2014.)

Kupias and Salo (2014) outline a spectrum of four mentoring types, which have evolved to answer to changes in working life: first, second, third and fourth generation mentoring. In first generation mentoring the focus is on the mentor and her knowledge and skills rather than on the mentee and her learning needs. Due to changes in approaches to learning, from second generation mentoring onwards the mentee with her learning needs moves more and more to the centre. The mentor's role can also come closer to that of a coach, as is the case in third generation mentoring. As the latest development, the clear roles vanish leaving two peers to mentor each other, as in fourth generation mentoring. Kupias and Salo (2014) also point out that each mentoring type has its assets and drawbacks, and that different types of mentoring relationships serve different purposes. In any case, they locate a 'mentor' as someone who draws both from her experience and

is open to listen to the mentee. Reflexivity and the quality of being dialogical are considered the cornerstones of a mentoring relationship. (Kupias & Salo 2014.)

In reverse mentoring the traditional roles of an older mentor and young mentee are inverted (Clarke, Burgess, van Diggele & Mellis 2019, 693; Kupias & Salo 2014). According to Zauchner-Studnicka (2017, 551) reverse mentoring

> […] refers to a reciprocal and temporally stable relationship between a less experienced mentor providing specific expert knowledge and a more experienced mentee who wants to gain this knowledge. This relation is characterized by mutual trust and courtesy, it aims at facilitating learning and development of both, the mentor and the mentee.

Murphy (2012, 555) lists four characteristics of reverse mentoring: 1) unequal status of partners, 2) focus on knowledge sharing, 3) emphasis on leadership development and 4) mutual support. From the point of view of the mentees, Murphy sees the focus on knowledge sharing as decisive. The fourth point, mutual support, resonates well with Zaucher-Studnicka's definition, which highlights reciprocity. Additionally, Table 1 below shows Murphy's comparison of the functions of reverse mentoring and traditional mentoring in terms of career support, psychosocial support and role modelling. It can clearly be seen how some of the functions overlap, but some are distinctive of reverse mentoring.

Table 1. Reverse Mentoring and Traditional Mentoring compared. Adapted from Murphy 2012, 556.

Reverse Mentoring and Traditional Mentoring Compared		
	Reverse Mentoring Functions	Traditional Mentoring Functions
Career Support	Knowledge Sharing	Sponsorship
	Coaching	Coaching
	Exposure and visibility	Exposure and visibility
	Skill development	Protection
	Challenging ideas	Challenging assignments
	Networking	
Psychosocial Support	Support and feedback	Role modeling
	Acceptance and confirmation	Acceptance and confirmation
	Friendship	Friendship
	Affirmation and encouragement	Counseling
Role Modeling	New perspective	
	Behaviour to emulate	
	Identifying with values	

The origins of reverse mentoring lie in the business and IT-sector (Perry 2009 according to Clarke & al 2019, 695). Usually, the formal beginning of reverse mentoring is dated back to 1999 and localized in the company General Electric (Chaudhuri & Ghosh 2012, 56; Greengard 2002 according to Murphy 2012, 550). However, at least one master thesis on reverse mentoring in higher education was written before the turn of the Millenium at the Iowa State University (Reinhart 1997). More recently, there has been a call for a wider application of reverse mentoring in the academia (Morris 2017, 285–287). Some early examples of reverse mentoring in higher education include graduate students mentoring faculty members about digital technology at the California State University (Leh 2005) and a reverse mentoring program around the same topic established in the University of Hertfordshire's Business School (Evans, Goossens & Jefferies 2009).

Academic literature on reverse mentoring is rare (Kase, Mihelic & Saksida 2019, 57; Morris 2017, 285; Murphy 2012, 550; Peterson 2012, 89). Actual research literature on it is even more scarce and combined with it emerges the problem of research quality. Reverse mentoring has been implemented most commonly in the corporate world (Chaudhuri & Ghosh 2012, 57), but literature in the context of banking (Keleş Tayşir & Ülgen 2017), public administration (Hays & Swanson 2011), hospitality (Cismaru & Iunius 2019) and education is available as well. As for higher education, reverse mentoring approach has been used as part of service learning projects (Leedahl, Brasher, Estus, Breck, Dennis & Clark 2018 "Cyber Seniors") or students mentoring professionals in working life (Clarke, Burgess van Diggele & Mellis 2019, Murphy & Adams 2005 in the field of medicine). In secondary education there is an Austrian example of addressing gender stereotypes in ICT by using female pupils as technology mentors for their teachers (Zauchner-Studnicka 2017). However, the interest of this thesis lies in professional development of teachers, mainly in higher education.

In working life, reverse mentoring belongs to the realm of human resource management and is seen as way to cater to the different needs of different generations, most typically the "Baby Boomers" and "Millenials" (Chaudhuri 2012, 55). Most of the time the literature looks at reverse mentoring from the point of view the mentors, not the mentees. In order to emphasize the active ageing approach, this Master's thesis explores the role of reverse mentoring for the benefit of the older workforce.

Reverse mentoring is often credited for keeping the established organization members up-to-date on current trends (Harvey, McIntyre, Heames & Moeller 2009 according to Murphy 2012, 551). This is no less relevant for higher education institutions, especially when it comes to digitalization and its implications to teaching and learning as presented in the previous chapter. Even though reverse mentoring is usually used for enhancing the mentees technological skills and understanding social media, in principle, any topic of relevance to an organisation can be the subject of a reverse mentoring program (Murphy 2012, 550).

Schulz and Roßnagel (2010, 383) locate mentoring as informal learning, but Hansman (2016, 33) sees aspects of both formal and informal learning intertwined in it. In her opinion is it important to recognize both types in order to understand their contribution to learning as a whole. Ropes (2014, 8; 2015, 16) considers reverse mentoring as one way of intergenerational learning.

In the end, age is not the deciding feature in the reverse mentoring relationship, since it is about expertise. Madison (2019, 52) defines reverse mentoring as "an emerging professional advis[ing] an established professional". Reverse mentors can be found everywhere, depending on what is wished to be learned. In Madison's (2019) case study an experienced middle school teacher was paired up with a fresh journalism school college graduate as her mentor in order to answer to the challenges faced in terms of journalistic learning due to partisan politics in the United States in recent years. Following this example, it would seem an interesting prospect of professional development to learn from another professional altogether. This would suit especially cross-cutting themes, such as critical or informed thinking, or diversity issues, which are relevant in any field.

However, this Master's thesis concentrates on teacher professional development especially in terms of digital competence. The previous chapters presented the concept of older workers, them as learners, implications of digital transformation to HEI teachers' professional development and the concept of reverse mentoring. Reverse mentoring has the potential to be learner-centred, which was called for earlier. It is also typically reciprocal, which meets well with older workers' interest to share their knowledge as well. The next part of the thesis will present the purpose, aims and tasks. After that it will move on to the methodology, the implementation of it and the results.

3   Purpose, aims and tasks of the thesis

The purpose of this master thesis is to explore the potential of reverse mentoring as a means of continuing professional development at HEIs and based on the findings make recommendations regarding potential implementation to the commissioning university of applied sciences. Moreover, any organization with older knowledge workers could potentially benefit from the findings of this thesis.

The aim of this Master's thesis is to explore current literature on the reverse mentoring as a means of continuing professional development in terms of digital skills in the context of higher education institutions.

The research questions are:
- What are the benefits of reverse mentoring for the mentee?
- What are the essential components of a successful reverse mentoring program from the organizational point of view?

The task of this Master's thesis is to find relevant literature, analyse it and report the results according to the methodology of systematic literature reviews.

4   Thesis Development Process and Methodological Choices

4.1   Methodological Choices of the Research-Based Development

The Finnish Applied Sciences Universities Act (932/2014), states:

> --- it is the duty of a university of applied sciences to carry out research, development and innovation activities that support education at Universities of Applied Sciences, promote working life and regional development and reform the region's business structure, and to carry out artistic activities. In pursuing these duties, Universities of Applied Sciences must promote lifelong learning.

In accordance with the duties summarized by the Act, the Master's thesis needs to include both scientific research and development components, and they can be prioritized differently. In this thesis, the developmental task of writing and then presenting recommendations regarding the potential implementation for a HEI is based on knowledge gathered using the methodology of an integrative literature review, which is considered a research method in its own right (Torraco 2016, 404).

Systematic literature review was chosen as the methodology since the Master's thesis is expected to be used in the decision making process regarding the continuing professional development organised by the commissioner (Aromataris & Munn 2017a). Delivering well-informed recommendations for action will serve as the starting point for further decisions about the implementation. In the following two subchapters, literature review, systematic literature review and Joanna Briggs Institute mixed methods systematic review (MMSR) will be presented.

4.2   Literature reviews

The purpose of a literature review is to write an academic text in its own right based on an extensive number of primary source materials (Galvan & Galvan 2017, xvi; Torraco 2016, 404). According to Evans (2007, 137), regardless of their scope and methodology, literature reviews seek to summarize existing literature concisely and informatively. Due to this common denominator, all reviews typically consist of the same parts: search, appraisal, synthesis and analysis. Similar to other research methods, conducting a literature review requires a broad understanding of the topic under discussion (Suhonen, Axelin & Stolt 2016, 7–8).

The classification of literature reviews depends on the discipline and context. However, one way of bringing clarity into the picture is to divide literature reviews broadly into three different categories according to their purpose: 1) narrative literature reviews, 2) systematic reviews and 3) meta-analyses. Narrative literature reviews are mainly descriptive. In order to obtain a deeper analysis rather than staying on the descriptive level, systematic literature reviews follow a clearly defined protocol, which enables comparison

and a deeper analysis of the literature regarding the research question. Meta-analysis in its turn, has two meanings: on one hand, it refers to certain types of literature reviews conducted on qualitative research papers in regards to their data, and on the other hand it is a method used to analyse quantitative research. (Suhonen et al. 2016, 8.)

4.3 Systematic literature review

In order to ensure the coherence of critical appraisal tools and quality of the methodology in general, this Master's thesis leans on the Joanna Briggs Institute's (JBI) Reviewer's Manual (Aromataris & Munn 2017b). The aims of systematic reviews are

> to provide a comprehensive, unbiased synthesis of many relevant studies in a single document using rigorous and transparent methods. A systematic review aims to synthesize and summarize existing knowledge. It attempts to uncover "all" of the evidence relevant to a question. (Aromataris & Munn 2017a.)

In order to achieve these aims the following steps are followed: 1. formulating a review question, 2. defining inclusion and exclusion criteria, 3. locating studies through searching, 4. selecting studies for inclusion, 5. assessing the quality of studies, 6. extracting data, 7. analysing and synthesizing the relevant studies and 8. presenting and interpreting the results (Aromataris & Munn 2017a.)

The importance of composing the research plan in advance in order to minimize researcher bias is a crucial feature of systematic literature reviews (Evans 2007, 139; Whittemore 2007, 149; Aromataris & Munn 2017a). The quality of a systematic review depends heavily on the extent to which methods are followed during the review process. As such, explicit and exhaustive reporting of the methods used in the synthesis is a necessity and a hallmark of any well conducted systematic review. (Aromataris & Munn 2017a.)

In the planning phase it is recommended to map the current situation of available literature and to scrutinize prior systematic literature reviews conducted on the same topic. It is also worth to consider the available resources: the access to databases as well as technical and

human resources. As for the human resources, a minimum of two people are required to perform the systematic literature review in order to lessen the risk of bias. Moreover, the skills and expertise of the researchers influence the quality of the systematic review naturally as well. (Aromataris & Munn 2017a.)

The preliminary literature searches conducted for this Master's thesis revealed the results to consist mainly of more qualitative and fewer quantitative papers. In order to incorporate both types of studies, the JBI mixed methods systematic review (MMSR) protocol was chosen. In addition to the established stages of a systematic literature review presented earlier, a MMSR protocol has distinctive features regarding the data transformation, synthesis and the sequence of synthesis. Since the research questions could be answered with both qualitative and quantitative of studies, the convergent integrated approach was found appropriate. Due to the majority of the papers being qualitative, the quantitative research results were 'qualitized' before analysis. This enabled the data to be analysed with meta-aggregation. (Lizarondo, Stern, Carrier, Godfrey, Rieger, Salmond, Apostolo, Kirkpatrick & Loveday 2020.)

JBI uses meta-aggregation as the methodology for systematic reviews on qualitative research, since it combines element both from the quantitative and qualitative traditions. It can also be seen to be an adaptation of meta-analysis to qualitative research. This type of approach does not seek to re-interpret the original results, but to extract what is called *findings* in the text and to aggregate them into categories, which then form synthesized findings. Picture 3 shows a schematic representation of the core concepts of meta-aggregative systematic literature review and their relationships. Meta-aggregation is well-suited for the formulation of recommendations, which makes it applicable for this Master's thesis. (Lockwood, Porrit, Munn, Rittenmeyer, Salmond, Bjerrum, Loveday, Carrier & Stannard 2017.)
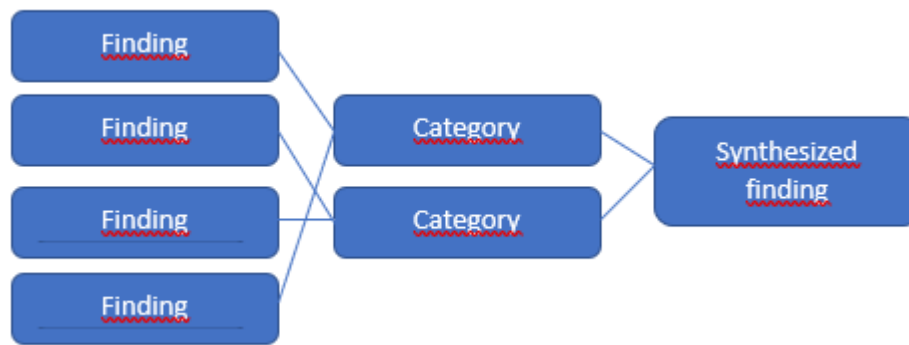
Figure 3. A schematic representation of the core concepts of meta-aggregative systematic literature review and their relationships (Lockwood et al. 2017).

In contrast to quantitative research "[t]here is no hierarchy of evidence among methodologies for qualitative studies", which means the studies are allowed to vary in their paradigm and in their methodology. Allowing a diversity of approaches rests on the reasoning that the context and point of view are embedded in the results and therefore automatically transmitted. (Lockwood et al. 2017.)

Synthesising qualitative research is different from primary qualitative research, however its principles and processes rely on the same methodological considerations. Two pertinent discussion topics are 1) to what extent a literature review is inductive or deductive, and 2) whether it should seek to be analogue to quantitative literature reviews or should it seek to look for its methodological foundation in the traditions of qualitative research. Meta-aggregation draws from both of the traditions. (Lockwood et al. 2017.)

4.4 Inclusion and exclusion criteria

Due to the preliminary searches which indicated a scarcity of available studies on reverse mentoring in general, the inclusion criteria were set to encompass all educational levels on the condition that the document dealt with teacher professional development. Articles regarding service learning, even though the implementation of a reverse mentoring setting was present, were excluded since the abstract revealed they would not address the benefits for older teaching staff.

The linguistic limitations were set to match with the language skills of the reviewer. JBI guideline points out the potential exclusion of relevant studies due to language and suggests employing a translator where necessary, or at a minimum mentioning the encountered article languages (Lockwood et al. 2017). In particular, the CORE database offered search results in Japanese, Dutch, French, Portuguese, Spanish, Turkish and Ukrainian. The English term "reverse mentoring" seemed to be used in all of the mentioned languages, but any further analysis of the contents of the studies could not be done. Table 2 lists the inclusion criteria.

Table 2. Inclusion criteria.

Inclusion criteria
Published in English, German or Finnish.
Publications by commercial and academic publishers Grey literature: "Theses and Dissertations, Reports, blogs, technical notes, non-independent research or other documents produced and published by government agencies, academic institutions and other groups that are not distributed or indexed by commercial publishers" (Lockwood et al. 2017)
The research questions can be answered./ The focus is on the mentee's side.
The paper concentrates on reverse mentoring.
The context is education and teacher professional development or faculty development.

4.5 Search strategy and study selection

The literature search for the studies started in the beginning of June and the last search was made on July 11, 2020. The search strategy followed the JBI guideline for systematic literature review for qualitative evidence, which consists of three phases (Lockwood et al. 2017). However, some adaptations were implemented. In the first phase, the initial search was conducted in three languages in several databases. The choice of databases was dictated by the institutional library licenses and included Ebsco Academic Search Elite

and Ultimate, Connecting Repositories (CORE), Bielefeld Academic Search Engine (BASE), Theseus and Directory of Open Access Journals.

After the first searches it became apparent that among the three included languages English was the most dominant and the further searches were conducted using only English search terms. The second phase with database-specific searches was virtually non-existent since synonyms for "reverse mentoring" were difficult to identify. Additionally, not all databases (eg. CORE) provided a list of subject terms. However, parallel to reviewing the reference lists of the included articles, two further search words were identified: 'faculty development' and 'faculty technology mentoring'. New searches were conducted in Ebsco Academic Search Elite and Ebsco Academic Search Ultimate.

After the searche process was concluded, all documents were screened by reading their title and abstract and assessing them using the inclusion criteria. The studies with full text available were uploaded into the reference management system Mendeley Desktop v.1.19.6.

4.6   Assessing the methodological quality

The methodological quality of the qualitative studies and the qualitative part of the mixed methods studies were assessed using JBI Critical Appraisal Checklist for Qualitative Evidence. The minimum amount of points was set at 5/10 in order to ensure the quality of the included studies.

The two mixed methods case studies posed more of a challenge than expected, since none of the JBI checklists for different kinds of quantitative evidence could be applied for the quantitative part. This was due to JBI checklists for quantitative evidence were established for study designs common in medical and health care studies, which did not match with the quantitative designs in question.

The discrepancy between JBI including mixed methods studies in the evidence (Lizarondo et al. 2020) and yet lacking a critical appraisal tool for mixed method case

studies led to looking for critical appraisal protocol elsewhere. However, there did not seem to be a broadly established version available (Heyvaert, Hannes, Maes & Onghena 2019). Additionally, the benefit of including two dissertations employing the research design of mixed method case study was considered to outweigh the problems related to the lack of an established critical appraisal protocol for this type of studies. It became clear it was necessary to appraise the qualitative and quantitative parts separately (Heyvaert et al. 2019). After a discussion with a colleague, the general quality criteria of reliability, validity, objectivity and reproducibility were applied (Raithel 2008, 157).

4.7 Data extraction, data transformation and data synthesis

The data extraction was conducted using the JBI QARI Data Extraction Tool for Qualitative Research (see Appendix 2). Details on the methodology, methods, phenomena of interest, geographical and cultural setting, participants, data analysis and author's conclusions were obtained from each study before moving on to the extraction of findings. Following Lockwood and others (2017) "a finding is defined as a verbatim extract of the authors analytic interpretation". The findings were identified only in the results section in order to ensure the extraction of an illustration to accompany it. A level of credibility was allocated to each finding. Non-supported findings were not included in the data synthesis and integration. (Lockwood et al. 2017.)

There was only one study that included quantitative data, which could answer one of the research questions. The quantitative data was 'qualitized' by first counting the percentages of two or three most positive answers (depending on the answer options) for each relevant question. Second, the percentages and answer options were expressed in full sentences.

For this review, the convergent integrated approach in accordance with the JBI methodology for mixed methods systematic review was used. This implied 'qualitizing' quantitative data in order to perform the synthesis with the qualitative data. The data synthesis is best described with "[a]ssembled data were categorized and pooled together based on similarity in meaning to produce a set of integrated findings". (Lizarondo et al. 2020.)

5   Results

5.1   Study inclusion

The flowchart depicted in picture 7 illustrates the process of acquiring data. The first phase was running searches in several search services and databases available via Karelia University of Applied Sciences and Carinthia University of Applied Sciences. These databases included Ebsco Academic Search Ultimate, Bielefeld Academic Search Engine (BASE), Directory of Open Access Journals (searching for articles), theseus.fi, Connecting Repositories (CORE) and Ebsco Academic Search Elite. Altogether 1176 hits were examined, and many of these were duplicates. The author cannot provide the exact number of duplicates since four of the databases did not have the automatic function of omitting duplicates and keeping track of them proved very laborious. The rest of the omitted studies did not fulfil the inclusion criteria based on reading the abstract.

The original searches resulted in 12 articles for more detailed screening. Out of these, four articles fulfilled the inclusion criteria. The low number of included studies emphasized the necessity of identifying further key search words, which were run in the same search engines and databases as in the beginning. Seven further articles were identified this way, out of which three fulfilled the inclusion criteria. Finally, a hand search in all of the seven included studies included in two being included for critical appraisal. However, one article was excluded due to poor methodological quality. Madison's study was included because it discussed teacher professional development, even though not in the field of ICT skills.

Picture 7. Flowchart of the selection process
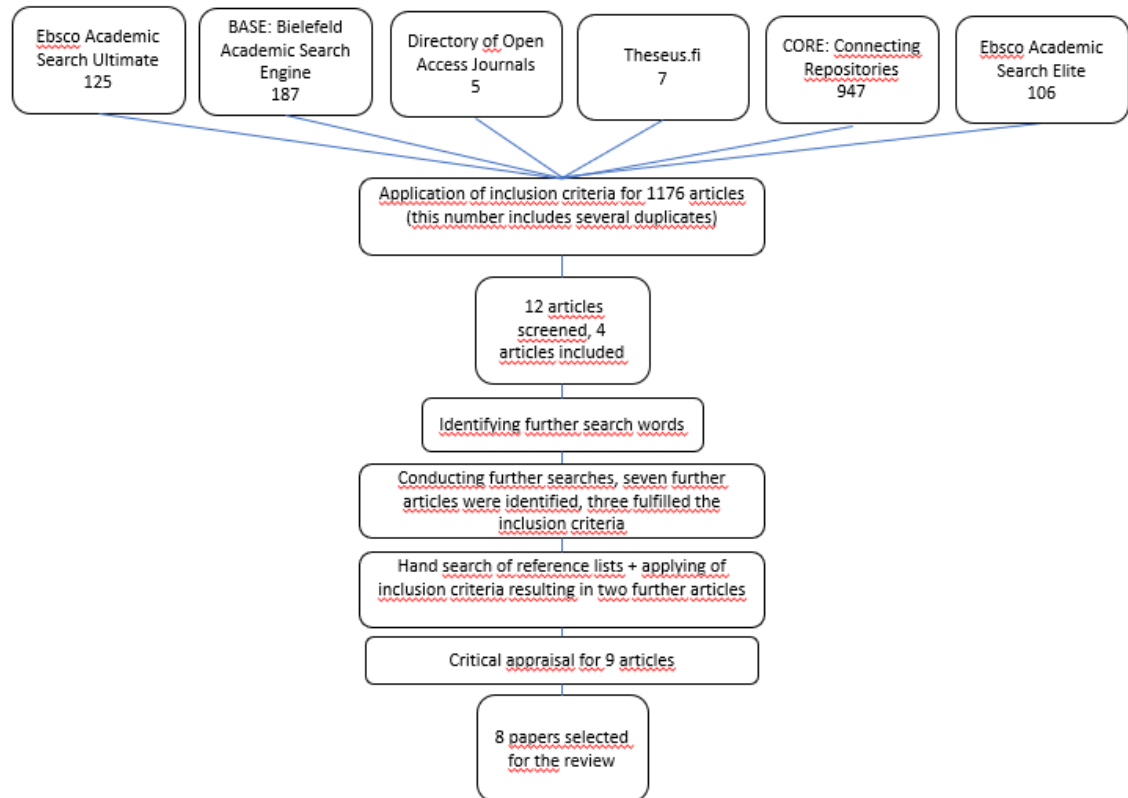
5.2 Methodological quality

All of the included studies were case studies. For the qualitative case studies, assessing the methodological quality was conducted using JBI Critical Appraisal Checklist for Qualitative Evidence. This was the case for six of the included studies. The two mixed methods case studies posed more of a challenge, since there did not seem to be a broadly established critical appraisal protocol for mixed methods case studies (Hyvaert, Hannes, Maes & Onghena 2013). In order to be able to critically appraise the quantitative part of the mixed methods case studies, the general quality criteria of reliability, validity, objectivity and reproducibility were applied (Raithel 2008, 157). For the qualitative part of the study the JBI critical appraisal protocol for qualitative evidence was applied.

Table 3 below shows a summary of the critical appraisal of the qualitative studies and the qualitative part of mixed methods studies. The Q1-Q10 refers to the questions 1 to 10 in JBI Critical Appraisal Checklist for Qualitative Studies (Lockwood et al. 2017).

Table 3. Summary of critical appraisal of the qualitative studies and qualitative part of mixed methods case studies.

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total
Alvarez et al.	N/A	Y	Y	Y	Y	Y	Y	Y	N	Y	8/10
Baran (2015)	U	Y	Y	Y	Y	U	U	Y	Y	Y	7/10
Baran (2016)	Y	Y	Y	Y	Y	U	N	Y	Y	Y	8/10
Callahan	U	Y	Y	Y	Y	U	Y	Y	Y	Y	8/10
Evans et. al	N	Y	Y	Y	Y	Y	N	Y	N	Y	7/10
Li	U	Y	Y	Y	Y	U	Y	Y	Y	Y	8/10
Madison	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
Peterson	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10

Reading Table 3 column-wise reveals that questions 1, which deals with the congruity between the stated philosophical perspective and the research methodology, was clear only in three cases. This is due to majority of the studies not clearly stating their philosophical perspective. Questions 2, 3, 4 and 5, which deal with other aspects of research congruity, were always in place. Question 6, which calls for a statement of locating the researcher culturally or theoretically, was unclear in half of the studies. Question 7, which asks if the influence of the researcher was addressed, was answered positively in five of the eight studies. Question 8 asks whether the "participants and their voices" are "adequately represented". Question 9 deals with the ethics of the study, which was not in place in two of the studies. This is due to the papers not addressing the fact of anonymity of their participants. Overall, each study was considered to draw its conclusions from the analysis or interpretation of the data, which is addressed by the last question.

5.3   Characteristics of included studies

The full list of study characteristics is presented in Appendix 3. Callahan's (2017) doctoral dissertation was a mixed methods case study, in which qualitative data dominated. The qualitative data was collected with an interview and the quantitative data by the means of a survey. The phenomena of interest were technology adoption and teachers' perspectives on reverse mentoring as a model for professional development in technology. The study was conducted in a suburban secondary school just outside of New York City with 15 student mentors and 15 teacher mentees. The dissertation was found with the search words "reverse mentoring" AND "university" in the Bielefeld Academic Search Engine. The quantitative data was not included in this review, since it did not answer the research questions.

Peterson's (2012) doctoral dissertation used mixed methods multiple case studies. The qualitative data consisted of observations, documents, discussions and interviews. The quantitative data was gathered with a survey. The phenomena of interest were meeting and overcoming the barriers of using ICT in teaching as well as reverse mentoring as a way of adult education. The study was conducted in two provincial secondary schools in New Zealand. In school A 20 student mentors and 20 teacher mentees participated in the study, whereas in school B four student mentors and 20 teacher mentees were involved. The dissertation was found using the search words "reverse mentoring" AND "university" in the Bielefeld Academic Search Engine. This was the only study to contribute to quantitative evidence for this mixed methods systematic review.

Alvarez, Blair, Monske and Wolf's (2005) study was a narrative inquiry, which used personal narrative statements based on experience as its data. The phenomena of interest were technology integration by means of reverse mentoring and team development, and faculty development needs in technology and pedagogy. The reverse mentoring program took place in a faculty in a U.S.A. university and the data stemmed from two faculty mentees and two student mentors. The study was located using the search words "reverse mentoring" AND 'academia' OR 'higher education' OR 'universities' OR 'university' OR 'college' OR 'colleges' in the database ERIC via the search mask Ebscohost Academic Search Elite.

Evans, Goossens and Jeffries' (2009) paper was the only piece of grey literature (published in the University of Hertfordshire Research Archive) included in this systematic review. It was a qualitative case study, which used interviews with selected mentees, focus group with the mentors and an e-mail questionnaire for data collection. The phenomenon of interest was the impact of the student mentor project in the Business School at University of Hertfordshire. Four faculty mentees and six student mentors had participated in the data gathering. The study was found in Bielefeld Academic Search Engine with the search words "reverse mentoring" AND 'university'.

Baran's (2015) qualitative case study used mentoring blogs, case reports and semi-structured interviews with the mentees as its data. The phenomenon of interest was technology adoption and integration of faculty in higher education. The study took place in a public university, where the reverse mentoring project was part of a graduate course. 12 faculty mentees and 12 student mentors took part in the study. The study was found in a manual search using Baran's (2016) reference list.

Baran's (2016) single case study dealt with the same reverse mentoring program as her 2015 article. This time the phenomena of interest were the perceived benefits for the mentors and elements of successful mentoring relationship. This article was found in an unusual way, since it was discovered when looking for the full text of another article in the Z-library. This article provided the search term "faculty technology mentoring".

Madison's (2019) qualitative case study was the only included study, which did not deal with reverse mentoring in the field of technology. Its phenomenon of interest was teacher professional development regarding journalistic learning with the help of reverse mentoring. The study took place in a public middle school in a rural community in the U.S. Pacific Southwest. The mentee was an established 6th grade English language and arts teacher and the mentor was a 25-year old fresh journalism school graduate. The reverse mentoring took place mainly as real-time co-teaching, which was very different from the other approaches used in the included studies. The study was located in ERIC via the search engine Ebscohost Academic Search Elite using the search words "reverse mentoring" AND 'academia' OR 'higher education' OR universities' OR 'university' OR 'college' OR 'colleges'.

Li's (2001) master thesis was a descriptive case study, which used interviews, journal entries, observations and case reports to gather its data. The phenomenon of interest was the student/faculty mentoring model at Iowa State University. Five faculty mentees and three student mentors participated in the study. The study was located in CORE by the use of the search words 'faculty technology mentoring' AND 'higher education'.

5.4 Findings of the review

This chapter presents the findings of the systematic mixed methods review. The text is divided into two subchapters, each addressing one of the research questions. The full table of findings and illustrations can be found in Appendix 4. Due to layout reasons, the findings, which are "verbatim extract of the authors analytic interpretation" (Lockwood et al. 2017) have been omitted from the tables embedded in the following chapters.

5.4.1 Benefits for the mentee

For the first review question "What are the benefits for the mentee?" the analysis revealed three synthesized findings. 'Experienced benefits of reverse mentoring' and "ICT-related benefits" both consisted of four categories, whereas 'Development as a teacher' had two categories. Table 4 shows the categories and synthesized findings. The full table including the findings can be found in Appendix 4, page 1.

Table 4. Categories and synthesized findings of the first research question.

Category	Synthesized finding
Opportunity to receive feedback	Experienced benefits of reverse mentoring
Availability of help	
Time efficiency	
Relationship to students	
More comfortable with computers	ICT-related benefits
Confidence with ICT	
Integration of ICT in the teaching	
Competence using ICT	
Development of personal pedagogy	Development as a teacher
New ideas	

The first category of 'Experienced benefits of reverse mentoring' was 'opportunity to get feedback'. Most of the findings derived from Madison's (2019, 55 & 57) study and addressed the importance of feedback as a means to step outside one's own habits. Another aspect of feedback was its immediacy (Li 2001, 70). The second category was 'Availability of help'. Many findings from Peterson's (2012, 234) study mentioned "help at hand" as one of the most appreciated aspects of the reverse mentoring programme in question. The help was considered both fast and competent.

The third category was 'Time efficiency', which relied on the minimum of two findings. The first one illustrates how the scarcity of faculty mentees' time was acknowledged by the student mentees (Evans et al. 2009). The other finding was collected from Peterson (2012, 233) and it mentioned time efficiency as one of the observed benefits for using students to help with the use of ICT. Similarly, the fourth category 'relationship to students' also relied on only two findings. Both findings originate from Peterson's (2012, 232 & 234) dissertation. The rapport with students was considered an aspect most appreciated in the reverse mentoring programme. Communication between the students and staff was mentioned as one of the observed benefits.

The first category of the synthesized finding 'ICT-related benefits' was more comfort with computers. It consisted of three findings all deriving from Li's (2001, 54–55 & 61) study and expressed an increase in comfort with computers due to the reverse mentoring program in question. The second category was confidence with ICT. Three of five findings were 'qualitized' data from Peterson (2012), addressing confidence with ICT in

general and in the classroom. Additionally, confidence in using students as mentors was included in this category. Confidence in trying things out (Peterson 2012, 229) and in "knowing it would work" (Peterson 2012, 234) were also aspects of gained confidence.

The third category was integration of ICT in the teaching. It consisted of the minimum two categories, both of which were 'qualitized' data from Peterson (2012). The clear majority of the teachers had reported to have integrated ICT in their teaching and learning and in their units of work. The fourth category was competence using ICT and similarly consisted solely of 'qualitized' data from Peterson (2012). The findings address different ICT competencies from using spreadsheets or databases to word processing or file management. "Level of competence in accepting help from technically capable students" was also included in this category.

The third synthesized finding was 'development as teacher' and it consisted of two categories. The first category was 'development of personal pedagogy', which got all of its findings from Peterson (2012). Half of the findings addressed the enhanced ability to teach more individually (Peterson 2012, 229 & 232). One finding stated the skill to develop new ways of learning as positive changes to classroom practices (Peterson 2012, 229). The only 'qualitized' finding stated that over half of the teachers considered the reverse mentoring programme to have been "somewhat or very significant for their overall development as a teacher" (Peterson 2012). The second category was 'new ideas'. Both of the findings were from Peterson's (2012) study and addressed the fact that the reverse mentoring program in question had provided a fresh look on the study participants' work as teachers.

5.4.2 Essential components of the reverse mentoring program

For the second research question "What are the essential components of a reverse mentoring program?" the analysis revealed three synthesized findings: preparation, optimal learning and mentoring relationship. All of the main themes encompass four to five subthemes, which are based on the findings identified in data extraction. Table 5 shows the categories and synthesized findings. The full table including the findings can be found in Appendix 4, page 2.

Table 5. Categories and synthesized findings of the second research question.

Category	Synthetized finding
Goal Setting	Preparation
Matching the mentee and mentor	
Barriers	
Supporting structures	
Time	Aspects of optimal learning
Individuality	
Relevance of contents	
Communication	Aspects of the mentoring relationship
Nature of the mentoring relationship	
Attitude and motivation	
Mentoring strategies	

Preparation consists of the categories goal setting, matching the mentee and mentor, creating supporting structures and taking into account possible barriers. The category setting goals includes clarifying the mentee's objectives both pedagogically and technologically (Alvarez et al. 2005, 184) as well as the roles and expectations of both mentors and mentees (Li 2001, 60).

The second category is matching the mentor and mentee. The process of finding a good match was considered worth giving enough time. In addition to a personal match also the compatibility of schedules was pointed out to be taken into consideration. (Callahan 2017, 95.)

The third category was addressing possible barriers before the start of the mentoring program. Technology could pose barriers, since specific applications were not allowed (Madison 2019, 57).

The last category in preparation is support structures. Several sources pointed out the importance of additional administrative, faculty and departmental support (Alvarez et al. 2005, 184; Baran 2016a, 63; Li 2001, 73 & 77; Madison 2019, 57). Support was considered as encouragement and acceptance by the working environment as well as practical support, for example by IT-support of the organisation.

The second synthesized finding is aspects optimal learning, which consisted of the categories time, individuality, nature of learning and relevance of contents. 'Time' emerged as a category, since it was identified as an essential component of learning (Baran 2016b, 102; Li 2001, 58). For some, time was always lacking, but some considered it a scheduling issue (Callahan 2017, 93). Regular meetings were mentioned as a way to ensure progress (Baran 2016b, 102).

The category 'individuality' consisted of four findings. One of them commented on the importance of individualised instruction for the mentee from the mentor's side (Li 2001, 75). Three other findings were comments from the teacher mentees. Individualization was seen to mean two things: it was the possibility to tailor the contents of the mentoring sessions according to the individual needs of the mentees and also the chance to adapt the contents on a short notice. (Callahan 2017, 101–104.)

The category 'relevance of contents' consisted of two findings. It was very close to the category of 'individuality', but was considered to be its own category, since both findings emphasized the aspect of instant applicability of the contents (Callahan 2017, 100; Baran 2016b, 101).

The category 'nature of learning' emerged when eight findings were pooled together. In one study both mentees and mentors had made the observation of the importance of privacy during mentoring sessions (Li 2001, 69 & 75). Additionally, Callahan's study (2017, 112) provided a finding, which addressed the ease and comfort related to privacy. Students were also considered to have the ability to explain things in an understandable way (Peterson 2012, 232). Findings stemming from Callahan's (2017) study pointed out the importance of hands-on nature of the reverse mentoring program and the opportunity to practice. The ease of integration and the opinion of the reverse mentoring program as

a better form of continual professional development were rooted in the practical approach of the program as well.

The third synthesized finding was named 'aspects of the mentoring relationship'. It consisted of the categories 'communication', 'nature of the mentoring relationship', 'mentor qualities', 'attitude' and 'motivation and mentoring strategies'. In the category 'communication', two findings addressed the communication between the mentor and the mentee and how it should be "open and frequent" (Li 2001, 60) and "continuous, sustained, open, positive and feedback-oriented" (Baran 2016b, 101). The mentor-mentee conversations about content, pedagogy and technology were essential (Baran 2016a, 59). The role of communication channels in the spread of information about technology integration practices was mentioned as well (Baran 2016a, 62).

The category 'Nature of the mentoring relationship' consisted of eight findings. A finding from Baran (2016, 101) mentioned "developing empathy, being open to constructive critiques, respecting confidentiality and establish a mutual understanding" as seminal components of a successful mentoring relationships. Further qualities were "shared responsibility, accountability, reciprocal learning and shared vision" (Baran 2016a, 61). Mutual trust and respect were also mentioned in a finding by Li (2001, 58). Evans et al (2009) considered it helpful to mix faculty mentees and student mentors from different backgrounds in order to contribute to a well-functioning mentorship. Madison (2019, 55) emphasized the importance of personal chemistry. A finding from Li (2001, 72) and from Madison (2019, 55) mentioned the 'learning community' as the key to effectiveness of mentoring.

The third category 'mentor qualities' consisted of three findings. It is related to the category "nature of mentoring relationship", but focuses more on individual mentors and their qualities. A finding from Madison (2019, 55) mentioned "maturity and collegiality" as "vital traits for successful reverse mentors". "Resourcefulness" was also appreciated in the mentor (Callahan 2017, 109). Taking an active role as a mentor was mentioned as well (Li 2001, 76).

The fourth category 'attitude and motivation' consisted only of two findings. A positive attitude was considered important in order to be able to deal with difficulties (Li 2001,

62). In Baran's (2016, 101) study the student mentors recognised the importance of motivation to both the mentees and mentors. The fifth category 'mentoring strategies' consisted of three findings, which illustrated some practical methods used during Baran's (2015, 58–59) reverse mentoring program. They were scaffolding, consideration of affordances and limitations of a technology before introducing a technology to a class and providing feedback about mentee's teaching and implementation of technology.

The final chapter will discuss the findings and categories of the MMSR in the light of the knowledge base, as well as the reliability and ethics of the thesis. Based on the discussion a recommendation for a reverse mentoring program at a HEI will be presented with some considerations. To conclude, further research topics will be suggested.

6   Discussion

6.1   Discussion of the results

The purpose of this Master's thesis was to explore the potential of reverse mentoring as a means of continuing professional development in the context of higher education institutions, as they are facing the challenges of keeping their employees up-to-date in terms of digital skills. The idea of looking into reverse mentoring in higher education stemmed originally from the interest in intergenerational learning and the fact that mentorship seemed to fit well with the preferred ways of adult learning. Originally developed in the corporate world, reverse mentoring was used to teach senior employees about social media (Chaudhuri & Ghosh 2012, 56). Most of the studies included in this systematic literature review dealt with ICT in teaching and learning, but none of the papers mentioned explicitly whether using social media for educational purposes was included or not, although it can be seen to have potential (Kukulska-Hulme 2012, Manca & Ranieri 2016). None of the studies addressed the age of mentees, either, which makes it impossible to say if especially older teachers were reached with the reverse mentoring programs.

The first research question was "What are the benefits of reverse mentoring for the mentee?" The three synthesized findings identified were experienced benefits of reverse mentoring, ICT-related benefits and development as a teacher. They consisted of altogether 10 categories, which were opportunity to get feedback, availability of help, time efficiency, relationship to students, more comfort with computers, confidence with ICT, integration of ICT in the teaching, competence using ICT, development of personal pedagogy and new ideas.

The second research question was: "What are the essential components of a successful reverse mentoring program from the organizational point of view?" The three synthesized findings were preparation, aspects of optimal learning and aspects of the mentoring relationship. The eleven categories identified were goal setting, matching the mentee and mentor, barriers, supporting structures, time, individuality, nature of learning, relevance of contents, communication, nature of the mentoring relationship, mentor qualities, attitude and motivation and mentoring strategies. The following paragraphs will take a closer look how the identified categories fit together with the aspects of adult learning and mentoring introduced in the knowledge base. Finally, the results related to ICT skills will also be reflected against the DigCompEdu framework and the influence of the different settings of the mentoring programs noted. All the studies pointed out that reverse mentoring was not the whole story of faculty technology development but could be a valuable part of it.

The notion of older workers preferring to learn in context (Ropes 2013, 723; Zwick 2012, 11) was supported by several findings of the review and can be seen reflected in the categories of 'relevance of contents', 'nature of learning' and 'integration of ICT in teaching'. The hands-on nature and ease of integrating the learning contents were considered positive. Clearly, learning in context also facilitates the ease of integration – the transfer from learning situation to application is an easy one. Acceptance of ICT in education has been a topic already since 1970's since having knowledge about the technical possibilities does not equal implementing it practically (Loague, Caldwell & Balam 2018, 2). An additional interesting aspect of the category of 'nature of learning' highlighted the privacy of the mentoring situations as conducive to learning.

A further topic supported by the findings was the necessity for tailoring the professional development to meet the specific needs of the teacher mentee (Ropes 2013, 720). As McQuiggan (2012) has pointed out, one size does not fit all. The category of 'individuality' consisted of four findings, three of them stemming from Callahan (2017) and one from Li (2001). Individuality was seen to mean two things: it was the possibility to tailor the contents of the mentoring sessions according to the individual needs of the mentees and also the chance to adapt the contents on a short notice (Callahan 2017, 101 –104).

The topic of time was addressed earlier in this Master's Thesis in the context of older workers motivation to learn: it has been suggested that older workers might be reluctant to invest large amounts of time into learning something new, since they perceive having a limited amount of it at their use (Raemdonck et al. 2015, 170). In the results of the MMSR the emergence of this topic regarding both research questions highlights its crucial nature. Regarding the benefits for the teacher mentees the category was named 'time efficiency' and was found in two studies (Evans 2009, Peterson 2012). In the case of essential components of a reverse mentoring program the category 'time' consisted of seven findings stemming from four studies (Baran 2016a, Baran 2016b, Li 2001, Callahan 2017). There does not seem to be a way around the fact that learning and implementing the learned knowledge in practice requires time. However, the findings suggested that the student mentors were aware of the scarcity of their teacher mentees' time. Additionally, having regular mentoring meetings appeared to be positive. It can be assumed that reserving time for learning in the frame of a reverse mentoring program is more likely to take place than being responsible for it only by oneself – at least for some type of learners.

The importance of the (organisational) environment, as pointed out by several authors (Davies et al. 2017, 185; Gosling 2011, 4; Raemdonck et al. 2015, 164; Staudinger & Bowen 2011, 302), was resonated in the category 'supporting structures' as part of the synthesized finding 'preparation'. The findings in the category addressed several aspects of organisational support, such as administrative, faculty and departmental support, including both practical aspects and encouragement (Alvarez et al. 2005, Baran 2016a, Li 2001, Madison 2019). Encouragement is especially relevant, since negative stereotypes such as seeing older workers as less motivated or slower in accomplishing tasks, might

become a self-fulfilling prophecy and influence their learning (Raemdonck et al. 2015, 175).

As for the aspects of reverse mentoring the results revealed the importance of matching teacher mentees and student mentors on the personal level, keeping in mind their schedules as well as matching mentees' learning needs with mentors' ICT skill levels. This is not surprising, since the relationship is at the core of mentoring (Kupias & Salo 2014). One example of meeting the learning needs was presented in Peterson's (2012) study. In his case the reverse mentoring program was organized in a secondary school as a help desk, in which the students could offer help on a short notice. However, it can be deduced that the problems were more technical in nature, rather than deeper pedagogical challenges. According to Chaudhuri (2019, 68), matching is crucial to the effectiveness of reverse mentoring. "Data-driven matching processes are much more reliable", but doing it manually is an option as well. Additionally, in Chaudhuri's (2019, 68) opinion becoming a mentor or mentee should be voluntary and both parties should receive training and support.

The categories 'communication' and 'nature of the mentoring relationship' also resonated with mentoring literature. In the category 'nature of the relationship' mutual trust, respect and confidentiality were mentioned in the findings. This coincides well with Chaudhuri's (2019, 69) recommendation for developing trust, confidentiality and transparency. It can be safely argued that without good communication this is impossible to achieve. The category 'mentor qualities' mentioned maturity, collegiality, resourcefulness and taking an active role as positive characteristics encountered in the student mentors. Following Kupias and Salo's (2014) classification, this refers to a second or third generation type of a mentor being preferred. This means being more mentee-centred and role of the mentor coming closer to that of a coach (Kupias & Salo 2014).

The category 'relationship to students' consisted of the minimal two findings, which both stemmed from Peterson's (2012) study. This category revealed how the reverse mentorship program had the potential to influence the teacher and student community in ways, which have little to do with improving the teacher mentees' ICT skills. It is well-known that mentoring programs have several benefits to both the mentee, the mentor and the organisation. Some examples include "talent management, recruiting and retention,

improving social equity and diversity, bridging technology gaps among employees, understanding trends and customers, and driving innovation" (Murphy 2012, 562).

All the findings for the category 'confidence with ICT' were provided by Peterson (2012). It is less surprising that confidence with ICT emerges as a category since Peterson explicitly asked for it, but nevertheless, it is interesting. Peterson does not provide a more detailed definition of what he means with confidence, but Peralta & Costa (2007, 76) consider confidence as a synonym to Bandura's concept of self-efficacy. It deals with the self-perception of one's capabilities and is a fundamental component of motivation (Bandura 2010, 801). If a reverse mentoring program has the influence of increased self-efficacy or confidence with ICT, it seems to address an issue that has been reported to potentially reduce work motivation (Kanfer & Ackermann 2004, 450).

It was interesting to juxtapose the synthesized finding 'ICT-related benefits', which consisted of the categories 'more comfort with computers', 'confidence with ICT', 'integration of ICT in teaching' and 'competence using ICT' and the DigCompEdu framework (Redecker & Punie 2017). Since most of the research findings dealt with increased comfort and perceived basic technical competency with the computers in general, not necessarily even with educational technologies, the comparison is fast to carry out: most of the topics included in the framework were not reflected in the findings. However, it needs to be noted that Peterson's (2012) ICT skills are much narrower in their focus than to the digital competences according to Redecker and Punie (2017). Additionally, the focus of the literature review was not on which digital skills reverse mentoring might help learn, but whether it was a suitable learning approach in the first place.

It is interesting that no other study included in the review contributed to this category, since enhancing teachers' ICT competence is usually the central aim of a reverse mentoring program. On the other hand, if a study is not explicitly interested in the topic, is does not appear in the results. It is also necessary to note that based on this category no conclusions can be drawn about the effectiveness of a reverse mentoring program in learning ICT skills compared to another approach. It can also be assumed that the improvement in ICT-related competences will depend on the match between the learning

needs of the teacher mentees and the skills of the student mentors as well as their personalities and schedules, as mentioned earlier.

Finally, it is worth pointing out the various settings and structures the reverse mentoring programmes included in this systematic literature review had. First, some of them took place in secondary schools (Callahan 2017, Madison 2019, Peterson 2012) and some in universities (Alvarez et al. 2005, Baran 2016a, Baran 2016b, Evans et al. 2009). In one of the universities the reverse mentoring programme was an extra activity the students took upon themselves (Evans & al. 2009). In all the rest of the universities it was run as part of graduate courses. The universities, which utilized reverse mentoring in their faculty technology mentoring programmes had the advantage of having study programmes in educational technology. This gave the student mentees an advantage when it came to educational technology instead of basic ICT skills. Higher education institutions lacking such programmes need to take this into consideration in their search for potential student mentors. For example, Larson (2009) opted for peer mentoring by more experienced colleagues due to this reason.

Further differences were how the reverse mentoring itself was organised. In Peterson's (2012) dissertation the students were organised like a help desk. Baran (2015 & 2016) was an example of using reverse mentoring dyads. Madison's (2019) setting differed from all the other studies by pairing a recent graduate student from a completely different education institution with the mentee at a secondary school. The piloting was successful, but financing and establishing the program in the future remained unclear. The lack of financial resources is a common one (Kukulska-Hulme 2012).

6.2   Discussion on the Reliability and Ethics of the Thesis

The Finnish National Board on Research Integrity (TENK) has published guidelines on responsible conduct of research. The guidelines point out that not only the research itself should be conducted with "integrity, meticulousness and accuracy", but also the manner it is being reported and evaluated. Additionally, it is important to respect other researchers' work by citing them properly. Even though the primary responsibility for following the guidelines lies with each researcher, the research organisation in the background has its

responsibilities as well. (TENK 2012, 30–31.) The mixed methods systematic literature review was conducted to the best of the authors abilities as well as writing this Master's thesis. In addition to calling for adherence to the guidelines for responsible conduct of research, the Rectors' Conference of Finnish Universities of Applied Sciences demands more attention be placed on the treatment and privacy of personal data (Arene 2018, 6). Moreover, since this master thesis is a systematic literature review, no personal data was involved.

The importance of composing the research plan in advance in order to minimize researcher bias is crucial to systematic literature reviews (Aromataris & Munn 2017a; Evans 2007, 139; Whittemore 2007, 149). Whittemore (2007, 153) addresses researcher bias further by noting that since it's fairly easy to find support for one's own interpretation, one should take care of looking for alternative explanations. However, the meta-aggregative approach to systematic literature reviews on qualitative evidence do not require the reviewer to re-interpret the data (Lockwood et al. 2017). Nevertheless, it is recommended to use two reviewers, which was not possible in this case. A further recommendation, which could not be followed, was involving of an experienced librarian in the reviews. (Aromataris & Munn 2017a.)

All the included articles should be read completely (Galvan & Galvan 2017, 6). There should also be evidence of rigour in critical appraisal of the articles: "an ethical component to rigour that involves truthfulness, conscientiousness and attentiveness to all aspects of the investigation" (Davies & Dodd 2002 according to Whittemore 2007, 153). In this study the critical appraisal of qualitative evidence was conducted using an established protocol by the Joanna Briggs Institute. In the face of not having an established protocol for mixed methods case studies nor for the quantitative design in question, the critical appraisal of qualitative evidence was conducted following the criteria of validity, reliability, representativity and reproducibility. In both cases the reviewer's limited understanding of the methodological approaches potentially influenced the rigour with which the critical appraisal could be conducted.

A systematic literature review should find all the literature there is available on the given topic. In the case of this Master's thesis, the search strategy relied heavily on the key term "reverse mentoring", which might have led to not finding all relevant literature. "Faculty

technology development" was identified later as a seminal concept and using it from the beginning might have led to finding more sources. Furthermore, the access to databases and articles was limited by the organizational library licenses.

In order to promote reproducibility, the systematic literature review has been reported as transparently as possible. Unfortunately, the reviewer did not manage to follow the JBI protocol for mixed methods systematic reviews as carefully as she would have liked to: the deviations from the protocol in the literature search phase (as explained in the chapter 4.5) might have contributed to the review being less extensive and thereby less reliable. Additionally, author's bias and preconceptions are virtually impossible to exclude completely. Rather, they can be made explicit.

Finally, the composition of some of the categories needs to be looked at critically. The three findings that constituted the category 'more comfort with computers' were all found in Li's (2001) study. Here it needs to be noted that two of the findings might comment on the same case of increased comfort, which highlights the problem of having only few studies to draw the data from: it might create a false impression of the representativeness of the findings. However, it can be stated that for some teacher mentees reverse mentoring can have a comfort-increasing effect.

The categories "development of personal pedagogy' and 'new ideas", which formed the synthesized finding 'development as teacher' overlapped each other. Again here, all of the findings stemmed from one study (Peterson 2012), which made their representativity questionable, but on the other hand both categories included one finding originating in the quantitative part of the study, which derived its data from a larger pool than the qualitative answers. This was due to many of the participant not answering the qualitative questions (Peterson 2012, 219). However, it seems that at least in Peterson's (2012) study reverse mentoring contributed to the overall professional development of the participant teacher mentees.

The opportunity to receive feedback was seen as a valuable feature of the reverse mentoring program (Madison 2019, 55). However, it is worth noticing that the most findings stemmed from Madison's (2019) study and the importance of feedback was most likely emphasized since the teacher mentee was quite alone in her everyday work with

the class. On the other hand, this emphasis is not surprising, since feedback is crucial for learning (Askew & Lodge 2000, 1).

6.3 Recommendations with considerations

Due to the problems related to the representativity of the findings, the generalization of the benefits for the mentee must be taken cautiously. However, as a summary it can be stated that reverse mentoring has potential to serve as one method of HEI teacher continuing professional development, since it appears to correspond to many of the preferred ways of adult learning. However, it cannot be stated that especially older workers would benefit from mentoring more than other age groups. As stated earlier, chronological age has only a limited explanatory power over an individual, and other characteristics of the learner should be taken into account.

The implementation of a reverse mentoring program should be considered carefully. The aspects identified with the second research question should be taken into consideration. Figure 4 presents the essential components of the reverse mentoring program as an infographic.

ESSENTIAL COMPONENTS OF THE REVERSE MENTORING PROGRAM

Preparation
- Goal setting
- Matching the mentor and the mentee
- Barriers
- Supporting structures

Aspects of the mentoring relationship
- Communication
- Nature of the mentoring relationship
- Attitude and motivation
- Mentoring strategies

Aspects of optimal learning
- Time
- Individuality
- Relevance of contents

Figure 4. Infographic: Essential components of the reverse mentoring program.

6.4 Further research

Several sources (eg. Chaudhuri 2019, 66; Kase, Saksida & Mihelic 2019, 57; Morris 2017, 285; Murphy 2012, 550; Peterson 2012, 89) have stated the scarcity of published papers on reverse mentoring despite its reported wide use as part of human resource management programs in the business sector. The call for more high-quality studies on current implementation in all fields of work is supported. Additionally, it would be interesting to understand why faculty technology mentoring does not seem to be as common a concept in Europe as in the U.S. higher education landscape.

Moreover, the different components of a reverse mentoring program should be looked at more closely. For example, choosing the mentors as well as matching the mentees and mentors seems to be a crucial part of success and it would be useful to understand the process more closely.

As for continuing teacher professional development, looking for other new ways of educational development would be interesting as well. For example, Bali and Caines (2019, 361) call for strategies which embrace "[learner] agency, equity and transformative potential". What those strategies could be, requires more research.

References

Alvarez, P., Blair, K., Monske, E. & Wolf, A. 2005. Team Models in Online Course Development: A Unit-Specific Approach. Educational Technology and Society 8(3), 176–186.

Askew, S. & Lodge, C. 2000. Gifts, ping-pong and loops – linking feedback and learning. In: Askew, S. (Ed.) Feedback for Learning. London and New York: RoutledgeFalmer, 1–18.

Applied Sciences Universities Act 932/2914.

Arene. 2018. Ammattikorkeakoulujen opinnäytetöiden eettiset suositukset. https://bit.ly/2UqMuZ0 28.5.2019.

Aromataris, E. & Munn, Z. 2017a. Chapter 1: JBI Systematic Reviews. In: Joanna Briggs Institute Reviewer's Manual. The Joanna Briggs Institute, 2017.

Aromataris, E & Munn, Z. (Editors). 2017b. Joanna Briggs Institute Reviewer's Manual. The Joanna Briggs Institute. Available from https://reviewersmanual.joannabriggs.org/

Baltes, P., Rudolph, C. W. & Bal, A. C. 2012. A Review of Aging Theories and Modern Work Perspectives. In: J. W. Hedge & W. C. Borman (Ed.) Oxford library of psychology. The Oxford handbook of work and Oxford University Press.

Bandura, A. 2010. Self-efficacy. In: Weiner, I.B. & Craighead, W.E (Ed.) The Corsini Encyclopedia of Psychology. Fourth edition. New Jersey: Wiley Sons & Inc. 801–804. 13.8.2020.

Baran, E. 2016a. Investigating faculty technology mentoring as a university-wide professional development model. Computing in Higher Education. 28(1). 45–71.

Baran, E. 2016b. Examining the benefits of a faculty technology mentoring program on graduate students' professional development. Journal of Digital Learning in Teacher Education 32(3), 95–104.

Barker, M., O'Hanlon, A., McGee, H., Hickey, A. & Conroy,R. M. 2007. Cross-sectional validation of the Ageing Perceptions Questionnaire: a multidimensional instrument for assessing self-perceptions of aging. BMC Geriatrics 7(9). doi:10.1186/1471-2318-7-9.

Brown, M., McCormack, M. Reeves, J, Brooks, D. C.& Grajek, S. 2020. EDUCAUSE Horizon Report, Teaching and Learning Edition. Louisville, CO: EDUCAUSE, 2020. 15.11.2020.

Bond, M., Marín, V. I., Dolch, C. Bedenlier, S. & Zawacki-Richter, O. 2018. Digital transformation in German higher education: student and teacher perceptions and usage of digital media. International Journal of Educational Technology in Higher Education 15, article number 48.

Buttigieg, D. 2011. The Business Case for an Age-diverse Workforce. In: Parry, E. & Tyson, S. (Ed.) Managing an Age-Diverse Workforce. London: Palgrave Macmillan, 7–23.

Callahan, T. M. 2017. An Investigation of Providing Technology Professional Development to In-Service Teachers through Reverse Mentorship: A Case Study. Doctoral dissertation. ETD Collection for Pace University. AAI10638071.

Castañeda, N. & Selwyn, N. 2018. More than tools? Making sense of the ongoing digitizations of higher education. International Journal of Educational Technology in Higher Education 15(22).

Chaudhuri, S. 2019. Perspectives in HRD – Reverse mentoring: Hallmarks for implementing an intergenerational intervention. New Horizons in Adult Education & Human Resource Development 31(3), 65–71.

Chaudhuri, S. & Ghosh, R. 2012. Reverse Mentoring: A Social Exchange Tool for Keeping the Boomers Engaged and Millenials committed. Human Resource Development Review 11(55), 55–76.

Clarke, A. J., Burgess, A., van Diggele, C. & Mellis, C. 2019. The role of reverse mentoring in medical education: current insights. Advances in Medical Education and Practice 10, 693–701.

Cleveland, J. N. & Hanscom, M. 2017. What is Old at Work? Moving Past Chronological Age. In: Parry, E & McCarthy, J. (Ed.) The Palgrave Handbook on Age Diversity and Work. London: Palgrave Macmillan, 17–46.

Cleveland, J. N. & Lim, A. S. 2007. Employee age and performance in organizations. In: Schultz, K. S. & Adams, G. (Ed.) Aging and work in the 21st century New York & London: Routledge, 109–137.

Davies, E., Hanley, K., Jenkins, A. & Chan, C. 2017. Learning and Training for Older Workers. In: Flynn, M., Chiva, A. & Li, Y. (Ed.) Managing the Ageing Workforce in the East and the West. United Kingdom: Emerald Publishing Ltd, 185–206.

European Commission. 1995. White paper on education and training. Teaching and learning – towards a learning society. Luxembourg: Office for Official Publications of the European Communities. https://op.europa.eu/en/publication-detail/-/publication/d0a8aa7a-5311-4eee-904c-98fa541108d8/language-en. 15.11.2020

European Commission. 2020. Digital Education Action Plan 2021–2027. https://ec.europa.eu/education/education-in-the-eu/digital-education-action-plan_en. 23.8.2020

Evans, D. 2007. Overview of methods. In: Webb, C. & Roe, B. (Ed.) Reviewing Research Evidence for Nursing Practice: Systematic Reviews. Singapore: Blackwell Publishing Ltd, 137–148.

Evans, J., Goossens, Y. & Jefferies, A. 2009. The Student-Staff Mentoring Project at the University of Hertfordshire. University of Hertfordshire Business School Working Paper. Hertfordshire Research Archive.

EU-OSHA, Cedefop, Eurofund & EIGE. 2017. Joint report on Towards age-friendly work in Europe: a life-course perspective on work and ageing from EU Agencies. Luxembourg: Publications Office of the European Union.

EU-OSHA. 2016a. Healthy workplace for all ages. What is age management? https://eguides.osha.europa.eu/all-ages/UK_en/what-is-age-management-0. 29.4.2020

EU-OSHA. 2016b. Healthy workplace for all ages. Recruitment, career development and redeployment. https://eguides.osha.europa.eu/all-ages/UK_en/recruitment-career-development-and-redeployment. 29.4.2020.

EU-OSHA. 2016c. Healthy workplace for all ages. Knowledge transfer, training and life-long learning. https://eguides.osha.europa.eu/all-ages/UK_en/knowledge-transfer-training-and-life-long-learning. 29.4.2020

EU-OSHA. 2016d. Healthy workplace for all ages. Flexible working time practices. https://eguides.osha.europa.eu/all-ages/UK_en/flexible-working-time-practices. 29.4.2020.

EU-OSHA. 2016e. Health promoting workplaces. How can workplaces promote health? https://eguides.osha.europa.eu/all-ages/UK_en/how-can-workplaces-promote-health. Accessed 22.8.2020.

Eurostat. 2019. Employment statistics. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Employment_statistics. Accessed 19.3.2020

Galvan, J. L. & Galvan, M. C. 2017. Writing Literature Reviews. A Guide for Students of the Social and Behavioral Sciences. New York: Routledge.

Gosling, M. 2011. Older learners in the workplace. London: The City & Guilds Centre for Skills Development.

Hansman, C. 2016. Mentoring and Informal Learning as Continuing Professional Education. New Directions for Adult and Continuing Education 151, 31–41.

Harada C.N., Natelson Love, M.C. & Tiebel, K.L. 2014. Normal Cognitive Ageing. Clinics in Geriatric Medicine 29(4), 737–52.

Hays, B. & Swanson, D. J. 2011. Prevalence and Success of Reverse Mentoring in Public Relations. Public Relations Journal 5(4).

Hyvaert, M., Hannes, K., Maes, B. & Onghena, P. 2013. Critical appraisal of mixed methods studies. Journal of Mixed Methods Research 7.

Kanfer, R. & Ackermann, P. 2004. Ageing, Adult Development and Work Motivation. Academy of Management Review 29(3), 440–458.

Kase, R., Saksida, T. & Mihelic, K. T. 2019. Skill development in reverse mentoring: Motivational processes of mentors and learners. Human Resource Management 58(3), 57–69.

Keleş Tayşir, N. & Ülgen, B. 2017. "Reverse Mentoring" Designs of Banking Sector in Turkey. Yönetim Bilimleri Dergisi/Journal of Administrative Sciences 15(29), 305–317.

Kogovsek, M. & Kogovsek, M. 2013. Retaining mature knowledge workers: the quest for human capital investments. Procedia – Social and Behavioral Sciences 106, 2280–2288.

Kukulska-Hulme. 2012. How should the higher education workforce adapt to advancements in technology for teaching and learning? The Internet and Higher Education 15(4), 247–254.

Kupias, P. & Salo, M. 2014. Mentorointi 4.0. Helsinki:Talentum. Alma Talent verkkokirjahylly. 15.11.2020

Larson, L. 2009. Descriptive Study of Mentoring and Technology Integration among Teacher Education Faculty. International Journal of Evidence Based Coaching and Mentoring 7(1), 119–135.

Leedahl, S. N., Brasher, M. S., Estus, E., Breck, B. M., Dennis, C. B. & Clark, S. C. 2018. Implementing an interdisciplinary intergenerational program using the Cyber Seniors® reverse mentoring model within higher education. Gerontology & Geriatrics Education 40(1), 71–89.

Loague, A., Caldwell, N. & Esenc, B. 2018. Professors' Attitudes and Perceptions about Technology Use in the Classroom. Alabama Journal of Educational Leadership 5, 1–11.

Lockwood C, Porrit K, Munn Z, Rittenmeyer L, Salmond S, Bjerrum M, Loveday H & Carrier J, Stannard D. 2017. Chapter 2: Systematic reviews of qualitative evidence. In: Aromataris E, Munn Z (Ed.) Joanna Briggs Institute Reviewer's Manual. The Joanna Briggs Institute.

Madison, E. 2019. Piloting journalistic learning in a rural Trump-supportive community: A reverse mentorship approach. Journal of Media Literacy Education 11(3), 49–60.

Manca, S. & Ranieri, M. 2016. "Yes for sharing, no for teaching!": Social Media in academic practices. Internet and Higher Education 29, 63–74.

Manca, S. & Ranieri, M. 2017. Implications of social network sites for teaching and learning. Where we are and where we want to go. Education and Information Technologies 22.

McCarthy, J. Heraty, N. Cross, J. & Cleveland, J. 2014. Who is considered an 'older worker'? Extending our conceptualisation of 'older' from an organisational decision maker perspective. Human Resource Management Journal 24(4), 374–393.

McQuiggan, C. 2012. Faculty development for online teaching as a catalyst for change. Journal of Asynchronous Learning Networks 16(2), 27–61.

Mercader, C. & Gairin, J. 2020. University teachers' perception of barriers to the use of digital technologies: the importance of the academic discipline. International Journal of Educational Technology in Higher Education 17.

Merriam, S. C. 2001. Andragogy and Self-Directed Learning: Pillars of Adult Learning Theory. In: New directions for adult and continuing education 89, 3–14.

Merriam, S. C., Caffarella, R. S. & Baumgartner, L. L. 2007. Learning in adulthood: a comprehensive guide (3rd edition). San Fransisco: Jossey Bass.

Merriam, S. C. & Baumgartner, L. L. 2020. Learning in Adulthood: A comprehensive guide (4th edition). San Fransisco: Jossey Bass.

Morris, L. V. 2017. Reverse Mentoring: Untapped Resource in the Academy? Innovation in Higher Education 42, 285–287.

OECD. 2020. The HEI is committed to digital teaching, learning and assessment practices. https://heinnovate.eu/en/resource/hei-committed-digital-teaching-learning-and-assessment-practices. 15.11.2020.

Onghena, P., Maes, B. & Heyvaert, M. 2019. Mixed Methods Single Case Research: State of the Art and Future Directions. Journal of Mixed Methods Research 13(4), 461–480.

Pandey, K. 2019. Expectations from Future Technologies in Higher Education: An Introduction. In: Zhang Y., Cristol D. (Ed.) Handbook of Mobile Teaching and Learning. Berlin: Springer. 1–5.

Peralta, H. & Costa, F. E. 2007. Teacher's Competence and Confidence regarding the use of ICT. Educational Sciences Journal 3, 75–84.

Peterson, M. J. 2012. Switching roles: An investigation into the use of reverse mentoring by students to encourage teachers' uptake of ICT in their pedagogical approach. Doctoral Dissertation. Curtin University.

Pitt-Catsouphes, M., Matz-Costa, C., & Brown, M. 2010. The Prism of Age: Managing age diversity at the 21st century workplace. In: S. Tyson & E. Parry (Ed.) Managing an age diverse workforce. London: Palgrave Macmillan. 80–94.

Quian, L. 2001. Assisting faculty with technology integration: a case study of a student/faculty mentoring program. A Master thesis. Retrospective Theses and Dissertations. Iowa State University.

Raemdonck, I., Beausaert, S., Fröhlich, D., Kochoian, N. & Meurant, C. 2015. Aging Worker's learning and employability. In: Bal, P.M., Kooij, D. & Rousseau, D. M. (Ed.) Aging Workers and the Employee-Employer Relationship. Springer International Publishing. 163–184.

Raithel, J. 2008. Quantitative Forschung. Ein Praxiskurs. Wiesbaden: Springer VS.

Ramlee & Kashefian-Naeeini. 2017. Moving Teaching and Learning into the Digital Era. International Journal of English Language & Translation Studies 5(3), 27–36.

Redecker, C. & Punie, Y. 2017. European Framework for the Digital Competence of Educators. Luxembourg: Publications Office of the European Union.

Ropes, D. 2013. Intergenerational learning in organizations. European Journal of Training and Development 37(8), 713–727.

Ropes, D. 2014. Intergenerational learning in organizations. An effective way to stimulate older employee learning and development. Development and Learning in Organizations 28(2), 7–9.

Ropes, D. 2015. Addressing the challenges of an ageing workforce: an intergenerational learning toolkit. Development and Learning in Organizations: An International Journal 29(4), 14–18.

Ross-Gordon, J. M., Rose, A. D. & Kasworm, C. E. 2017. Foundations of Adult and Continuing Learning. San Fransisco: Jossey Bass.

Schalk, R., van Veldhoven, M., de Lange, A. H., De Witte, H., Kraus, K., Stamov Roßnagel, C., Tordera, N., van der Heijden, B., Zappalà, S., Bal, M., Bertrand, F., Claes, R., Crego, A., Dorenbosch, L., de Jonge, J., Desmette, D., Gellert, F. J. Hansez, I., Iller, C., Kooij, D., Kuipers, B., Linkola, P., van den Broeck, A., van der Schoot, E. & Zacher, H. 2010. Moving European research on work and ageing forward: Overview and agenda. European Journal of Work and Organizational Psychology, 19(1), 76–101.

Smith, E. 2012. The Digital Native Debate in Higher Education: A Comparative Analysis of Recent Literature. Canadian Journal of Learning and Technology 38(3), 1–18.

TENK. 2012. Responsible conduct of research and procedures for handling allegations of misconduct in Finland. Guidelines of the Finnish Advisory Board on Research Integrity. Helsinki: Finnish Advisory Board on Research Integrity.

Staudinger, U. & Bowen, C. 2011. A systemic approach to aging in the work context. Zeitschrift für ArbeitsmarktForschung - Journal for Labour Market Research 44(4), 295–306.

Suhonen, R., Axelin, A. & Stolt M. 2016. Erilaiset kirjallisuuskatsaukset. In: Stolt, M., Axelin, A. & Suhonen (Ed.) Kirjallisuuskatsaus hoitotieteeessä. Turku: Turun yliopisto. 7–22.

Torraco, R. J. 2016 Writing Integrative Literature Reviews: Using the Past and Present to Explore the Future. Human Resource Development Review 15(4), 404–428.

Urick. M. J. 2017. Towards an Identity-Based Approach for Examining Age in the Workplace: Perspectives and Implications. In: Parry, E. & McCarthy, J. Palgrave Handbook of Age Diversity and Work. London: Palgrave McMillan. 47–65.

Wallin, M. 2014. Ikäjohtaminen Euroopassa. Näkemyksiä parhaista ikäjohtamiskäytännöistä EU27 maissa. Helsinki: Työterveyslaitos.

Whittemore, R. 2007. Rigour in integrative reviews. In: Webb, C. & Roe, B. (Ed.) 2007. Reviewing Research Evidence for Nursing Practice: Systematic Reviews. Singapore: Blackwell Publishing Ltd. 149–156.

World Health Organization. 2002. Active Ageing: a policy Framework. World Health Organization Noncommunicable Disease Prevention and Health Promotion Ageing and Life Course.

Zauchner - Studnicka, S. A. 2017. A Model for Reverse-Mentoring in Education. International Journal of Educational & Pedagogical Sciences 11(3), 551–558.

Zupančič, M. 2016. Older Knowledge Workers as the Labour Market Potential (Slovenia versus Finland). Naše gospodarstvo/Our Economy 62(4), 33–41.

Zwick, T. 2012. Why Training Older Employees is Less Effective. Discussion Paper no 11–046. Centre for European Economic Research.

Search strategy

Provider	Search Mask	Databases
EBSCO	EbscoHost	Academic Search Ultimate, eBook Academic Collection (EBSCOhost), ERIC, eBook Collection (EBSCOhost), PSYNDEX Literature with PSYNDEX Tests, Regional Business News, Business Source Premier; Academic Search Elite, Teacher Reference Center, OpenDissertations
Bielefeld University Library		BASE
Open University & JISC		CORE
OAPEN (Open Access Publishing in European Networks)		DOAJ -Directory of Open Access Journals
ARENE (The Rectors' Conference of Finnish Universities of Applied Sciences)		Theseus

Data Extraction instrument (Joanna Briggs Institute 2020)

JBI QARI Data Extraction Tool for Qualitative Research

Reviewer _____   Date _____

Author _____   Year _____

Journal _____   Record Number _____

Study Description

Methodology

_____

_____

Method

_____

_____

Phenomena of interest

_____

_____

Setting

_____

_____

Geographical

_____

_____

Cultural

_____

_____

Participants

_____

_____

Data analysis

_____

_____

Authors conclusions

_____

_____

Comments

_____

_____

Complete   Yes ☐   No ☐

Data Extraction Instrument (Joanna Briggs Institute 2020)

Findings	Illustration form Publication (page number)	Evidence		
		Unequivocal	Credible	Unsupported

Extraction of findings complete   Yes ☐   No ☐

Table of included study characteristics, part I

JBI QARI Data Extraction Tool for Qualitative Research																**Search details**	
								Study description									
Record number	Author	Year	Journal	Reviewed on	Methodology	Method	Phenomena of interest	Setting	Geographical	Cultural	Participants	Data Analysis	Authors conclusions	Comments	Database	Date	Search words	Critical appraisal score
1	Callahan, Thomas M.	2017	PhD/ Pace University	28.7.2020	Mixed methods case study (qualitative data weighed more)	Quali: Interviews; Quanti: survey (the stages of adoption of technology)	Technology adoption and teachers' perspectives on reverse mentoring as a model for professional development in technology	Suburban secondary school just outside NYC	U.S. East Coast	U.S. secondary chool	15 student and 15 teacher volunteers	Quali: Coding the interviews; Quanti: the data is irrelevant to my research questions;	Four main themes were identified: structure, implementation, customization and mentor interaction. Reverse mentorship has a positive effect on teachers level of technology adoption.		BASE	11.6.2020	"reverse mentoring" AND university	8/10
2	Peterson, Michael Joseph	2012	PhD/ Curtin University	28.7.2020	Mixed methods multiple case studies	Quali: Observations, documents, discussions and interviews; Quanti: Servey	Meeting and overcoming barriers of using ICT and using reverse mentoring as a way of adult education	Two provincial secondary schools	New Zealand	A) Girls' school with 250 stundents years 7 -13 and B) secondary school with 350 stundents years 7 & 8.	A) 20 students, 20 teachers: B) 4 students, 20 teachers	Quali: Grouping of the answers according to the questions; Quanti: descriptive statistical analysis, paired samples	Majority of the teachers found the reverse mentoring useful		BASE	11.6.2020	"reverse mentoring" AND university	Quali: 10/10; Quanti ok
3	Alvarez, Deborah; Blair, Kristine; Monske, Elizabeth; Wolf, Amie	2005	Educational technology and society	12.7.2020	Narrative inquiry	Personal narrative statements based on experience	Technology integration by means of reverse mentoring and team development, faculty development needs in technology and pedagogy	Degree program	U.S.	U.S. University	Two faculty members and two graduate students	Analysis method not identified	Pairing a graduate student with a faculty member and faculty workload were identified as obstacles for successful reverse mentoring. Support from higher levels of hierarchy and admin is imporant.		Ebscohost Academic Search Elite - ERIC	9.6.2020	"reverse mentoring" AND academia OR higher education OR universities OR university OR college OR colleges	8/10
4	Evans, Jenny; Goossens, Yoeri; Jeffries, Amanda	2009	Grey Literature	14.7.2020	Case study	Interviews with selected mentees, focus group with the mentors, e-mail questionnaire	Impact of the student mentor project	Business School at University of Hertfordshire	England	English University	Four faculty member mentees and six student mentors	Analysis method not identified	The program has been successful: benefits for the mentees and mentors have been identified. On the other hand problems their potential solutions have been identified.		BASE	11.6.2020	"reverse mentoring" AND university	7/10

Table of included study characteristics, part II

5	Baran, Evrim	2016 a	Journal of Computing in Higher Education	14.7. 2020	Qualitative case study	Mentoring blog, case report, semi-structured interviews with the mentees	Technology adoption and integration of faculty in higher education	Public university in Turkey, reverse mentoring as part of a graduate course	Turkey	Turkish public university	12 faculty member mentees and 12 student mentors (7 Masters, 5 PhD)	Within-case analysis and cross-case analysis; coding	Strategies to facilitate technology integration were identified and Faculty Technology Mentoring has proven effective in adopting technology		Hand search via Baran 2016	11.7. 2020	N/A	7/10
6	Baran, Evrim	2016 b	Journal of Digital Learning in Teacher Education	12.7. 2020	Single case study, narrative inquiry	Quali: Written self-reflection; Quanti: technology mentor survey	Faculty technology program and ist perceived benefits for the mentors and elements of a successful mentoring relationship	Public university	Turkey	Turkish public university	12 faculty member mentees, 12 graduate student mentors (3 male, 9 female) from different faculties	Quanti: Coding; Quali: descriptive analysis	Student mentors benefit in terms of professional development, knowledge and skills about technology and pedagogy; institutions should acknowledge the value of different mentoring models		Found via Z-Library when searching for Leh's article with the full article name.	29.6. 2020	N/A	8/10
7	Madison, Ed	2019	Journal of Media Literacy Education	16.7. 2020	Qualitative case study	Field observation, interviews, work-related artifacts	Teacher professional development regarding journalistic learning with the help of reverse mentoring	Public middle school in a rural community	U.S Pacific Southwest	U.S public middle school	Mentee: Established 6th grade English language, arts and social studies teacher; mentor: 25-year old recent journalism school graduate; the reverse mentoring included one-on-one planning, prep sessions and real time co-teaching; the topic was informed thinking (not ICT)	Transcription of interviews, coding of field notes and video footage logs	Reverse mentoring seemed to work in this case: it was both cost-effective and received good evaluations from the students		Ebscohost Academic Search Elite - ERIC	9.6.2 020	"reverse mentoring" AND academia OR higher education OR universities OR university OR college OR colleges	10/10
8	Li, Qian	2001	Master Thesis/ Iowa State University	19.7. 2020	Descriptive case study	Interview, journal entries, observation, case reports	Student/faculty mentoring model at Iowa State University: Why and how it works	Graduate student course	Iowa, U.S.	U.S. state university	5 faculty members and 3 students mentors	Characteristics of effective mentoring relationships were identified			CORE	11.6. 2020	faculty technology mentoring AND higher education	8/10

Findings, categories and synthesized findings for research question 1: Benefits for the mentee

Findings	Category	Synthesized finding
She pointed out the value of having access to another adult for validation and feedback	Opportunity to get feedback	Experienced assets of reverse mentoring
"This journalism program had me examine my teaching practices and it really is nice sometimes."		
Faculty mentees can get immediate feedback and just-in time assistance from mentors who sit right next to them during the mentoring sessions.		
"As teachers we're stuck in our own little worlds...it is very reassuring to be talking to [...] collegues."		
Aspects of he programme most appreciated: Availability of help when I need it	Availability of help	
Aspects of he programme most appreciated: Being able to call on a member of the class to provide technical assistance		
Aspects of he programme most appreciated: Excellent help, most appreciated and [students] explained how-to with each problem		
Aspects of he programme most appreciated: Great having student support when I need it. Very helpful with specific suggestions, practical and very professional		
Aspects of he programme most appreciated: Help on hand		
Aspects of he programme most appreciated: It's great to have someone reliable and competent		
Observed benefits for using students to help with the use of ICT: I don't have to worry about getting stuck.		
[Students] were always there when I needed them.		
One of the main benefits for the lecturers was that they had their 'problem' solved, but at the same time, none of their time was wasted.	Time efficiency	
Observed benefits for using students to help with the use of ICT: time efficiency		
Aspects of the programme most appreciated: Great rapport with my students. They are positive, knowledgeable and easy to work with. I'm keen to do more.	Relationship to students	
Observed benefits for using students to help with the use of ICT: Communication between students/staff build good relationships.		
He thought the mentoring process helped him become more comfortable with computers.	More comfort with computers	ICT-related benefits
Dr. Clark became more comfortable with using technology because of the mentoring program		
Results indicated that faculty mentees increased their comfort level with computers and improved their computer competency when they are involved in the mentoring program.		
52% of the teachers considered themselves confident or very confident using ICT after the reverse mentoring program	Confidence with ICT	
71% of the teachers considered themselves confident or very confident using ICT in the classroom after the reverse mentoring program		
94% of the teachers considered themselves confident or very confident in using students to help with ICT's in the classroom		
Positive changes to classroom practices: [the reverse mentoring] gives me confidence to try things out.		
Aspects of the programme most appreciated: Confidence to know it would work		
94% of the teachers had integrated ICT into teaching and learning to some extent, to a large extent or completely.	Integration of ICT in the teaching	
81% of the teachers reported having integrated ICT into their several , most almost all or all units of work.		
86% of the teachers considered the increase in the ICT use to be partially, largely or completely attributable to the programme.	Competence using ICT	
50% of the teachers reported their competence level in basic computer operations to be high or very high.		
63% of the teachers reported their competence level in file management to be high or very high.		
90% of the teachers considered their comptenece level in the use of word processing high or very high.		
30% of the teachers considered their level of competence in the use of spreadsheets high or very high		
24% of the teachers considered their level of competence in the use of databases high or very high		
43% of the teachers considered their level of competence in the use of graphics high or very high		
70% of the teachers considered their level of competence in the use of the Internet high or very high		
83% of the teachers reported their level of competence in the use of telecommunication high or very high		
45% of the teachers reported their level of competence with multimedia and presentation media high or very high		
90% of the teachers considered their level of competence in accepting help from technically capable students high or very high.		
Observed benefits for using students to help with the use of ICT: Individualising learning for them and for myself	Development of personal pedagogy	Development as a teacher
63% of the teachers considered the programme to have been somewhat significant or very significant for their overall development as a teacher		
Positive changes to classroom practices: I can teach to individual needs		
Positive changes to classroom practices: I can develop a new way of teaching		
65%of the teachers reported that the reverse mentoring program had contributed new ideas to their teaching and student learning or provided them with a whole new approach.	New ideas	
Observed benefit for using students to help with the use of ICT: A fresh pair of eyes or a new way of looking at a problem		

Findings, categories and synthesized findings for research question 2

Finding	Category	Synthetized finding
Effective mentoring relationships occur when mentors and mentees clarify their roles and expectations for each other in the mentoring	Goal setting	Preparation
Determine what a faculty member wants to accomplish pedagogically and technologically		
Planning: the students listed mutual goal setting and schedule planning as important planning activities that contributed to the success of their mentoring relationship.		
Mentor selection: If mentor selection was based on an application process...	Matching the mentee and mentor	
Good matches between student mentors and faculty mentees set a good tone for the relationship.		
"More time should be spent on matching up students and teachers and trying to make sure their schedules are compatible"		
Technology barriers	Barriers	
Technology could also impede implementation		
The pilot training program also demonstrated that it is important to have faculty, departmental and administrative support	Supporting structures	
Administration provide extensive support and encouragement for faculty who participate in the mentoring program		
Support: When asked about the their insight		
The program benefitted from partnering a forward-thinking teacher and administrator		
Faculty mentees and student mentors were grateful of the support they received from the CTLT and peers in the C I 610 course.		
Students considered time, flexibility and resources as vital elements of the program	Time	Aspects of optimal learning
Time is identified as an essential characteristic for the success of a mentoring relationship		
When all teachers (N=15) made at least on mention that there was not enough time to meet, many (N=10) viewed it as a scheduling issue.		
When asked in interviews about the challenges and limitations of the FTM program, faculty members observed that learning to integrate technology required significant effort and time		
From week 1 through week 33, concerned teachers approached the researcher over how much time they would be able to commit to the reverse mentorship experience.		
Faculty repeatedly commented that by meeting with their mentors every week helped them continually learn about technology.		
Regular mentoring meeting as key for sustained progress		
The student mentors agreed that offering individualized instruction to faculty mentees was critical to the success of the mentoring program	Individuality	
Individualised approach		
Specificity of content		
Flexibility of participants		
Student mentors frequently mentioned the importance of learning in a private and comfortable environment	Nature of learning	
Comfort with the mentor		
Faculty mentees appreciated the comfortable and friendly learning environment created by the mentoring experience		
Observed benefits for using students to help with the use of ICT: They present things in an easy style so easy to understand.		
The approach supports teachers through real-time professional development.		
Hands-on nature		
Opportunity to practice		
Ease of integration		
Continual professional development		
Instructional relevance	Relevance of contents	
Implementing new ideas		
Student mentors and faculty mentees mentioned the need for open and frequent communication between the participants	Communication	Aspects of the mentoring relationship
Communication: students considered continuous, sustained, open, positive and feedback-oriented communication critical elements of a productive mentoring relationship.		
Analysis revealed that technology selections and the design of learning activities resulted from mentor-mentee conversations about the connections between content, pedagogy and technology.		
Analysis revealed that communication channels plaeyd an important role in the spread of information about technology integration practices.		
The nature of the mentoring relationship: Developing empathy, being open to constructive critiques, respecting confidentiality and establishing a mutual understanding were critical factors to a successful mentoring relationship.	Nature of the mentoring relationship	
This means that the dynamism this 'partnership' creates is a positive one		
Mutual trust and respect seems essential for an effective mentoring relationship		
Another success factor that emerged was the nature of mentoring relationship, which was based on shared responsibility, accountability, reciprocal learning and shared vision.		
"I'm learning from Jacob and he's learning from me, so we are a learning community together."		
According to faculty mentees, the effectiveness of mentoring lies in nurturing a friendly technology learning community		
Positive rapport		
Personal chemistry is key.		
Resourcefulness of the mentor	Mentor qualities	
Instead of displaying technology superficially, student mentors were active consultants		
Maturity and collegiality are vital traits for successful reverse mentors, who might have limited work experience		
Motivation: Students recognized that both mentee and mentor motivation played an important role in a successful mentoring relationship and process	Attitude and motivation	
A positive attitude helped mentors and mentees troubleshoot and deal with technical problems and motivated them to keep		
During the technology exploration, scaffolding was used to develop mentees' technology integration skills as mentors oversaw the learning process	Mentoring strategies	
A common strategy before introducing a technology to a class was the consideration of ist affordances and limitations.		
Providing feedback regarding mentees' teaching and implementation of technology was another common strategy.		