PEER-REVIEWED RESEARCH PAPER

# Home Economic Teachers' ICT Use in Finland Seen From a Lens of Reciprocal Determinism

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## Abstract

*This study aims to investigate Finnish home economic (HE) teachers' use of information and communications technology (ICT) and uses triadic reciprocal causation as a means to enhance understanding of it. The study also aims to provide new insight into how HE teachers should be supported in their use of ICT to enhance student learning. Data were collected through semi-structured interviews with 12 HE teachers in 2019 and further examined through an abductive approach to content analysis. The findings show that HE teachers used ICT in a variety of ways, although they had trouble expressing their goals for its use. The findings further show that HE teachers' use of ICT not only depends on their goals, but also on several influences identified at both environmental and personal level in Bandura's model of triadic reciprocal determinism. Based on these findings, HE teachers need to be given support in settings goals for their ICT use. These goals are important because, in combination with performance feedback, they enable teachers to specify the conditions for successful ICT use. Furthermore, the study shows the need for HE teachers to develop digital skills and to have sufficient ICT infrastructure, on-hand pedagogical and technical support, shared practices, collegial support and follow-up teacher training that focuses on their individual requirements. Based on the results, we found Bandura's model to be useful for enhancing our understanding of the influences related to HE teachers' ICT use and their goals for its use.*

**KEYWORDS:** **HOME ECONOMICS; ICT; SECONDARY EDUCATION; RECIPROCAL DETERMINISM**

## Introduction

The significance of using information and communications technology (ICT) in teaching has been extensively discussed globally over the past decade (OECD, 2019) and studies have expressed many ways in which it can benefit students' learning. In Finland, the potential for students to use ICT for learning has been emphasised in the country's national core curriculum in relation to all school subjects (Finnish National Board of Education, 2014). Despite the marked importance and benefits of using ICT, various academic subjects have responded differently in how they implement ICT as a tool for students to learn (Erixon, 2010; Howard et al., 2015).

In home economics (HE), the integration of ICT in teaching is essential, although doing so remains a challenge (Elorinne et al., 2017; Sundqvist et al., 2020a; Tanhua-Piiroinen et al., 2016). HE is strongly linked to societal development, and the internet and a number of online services form an essential part of household management today (Hölttä, 2014; Poirier et al., 2017). According to the Finnish core curriculum, HE students should "form an understanding of the increasingly technological nature of daily life" (Finnish National Board of Education, 2014). There are several learning objectives in HE that require the use of ICT and development of related competences, especially those concerned with the development of consumer and financial skills. HE is also an important subject for preparing students for mastering complex issues in daily life, and there is no doubt that dealing with these multi-dimensional tasks requires effective skills in communication, collaboration, information-seeking and management, as well as the ability to use technology effectively (Lewin & McNicol, 2015;

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Poirier et al., 2017). Teachers have an important role to play in using ICT to support their students' learning (Finnish National Board of Education, 2014; OECD, 2019). Consequently, HE teachers are in a prime position for enhancing their students' achievement of learning objectives related to ICT.

This study is the third part of a Finnish project on ICT use by HE teachers. The first part of the project (Sundqvist et al., 2020a) revealed three dimensions of ICT use among HE teachers and suggests a relationship between teachers' beliefs and ICT use. The second part of the project (Sundqvist et al., 2020b) confirmed a relationship between HE teachers' ICT use and different factors, such as support, digital competence and perceived usefulness of ICT. Despite significant and meaningful determinants in the second part of the project, its findings could not fully describe HE teachers' ICT use. Based on these previous studies, and by adopting a qualitative research design, we explore this further in this third part of the project. More precisely, our aim is to investigate Finnish HE teachers' use of ICT in lower secondary education, using social cognitive theory and drawing on the model of triadic reciprocal causation to enhance understanding of it. The following research question is proposed: how can Finnish HE teachers' use of ICT, their goals and their influences be understood through the lens of reciprocal determinism?

**Previous research on ICT use**

Students, learning providers and educators are all encouraged to take advantage of ICT in order to support students' embrace of essential 21st century skills, such as critical thinking, creativity, communication skills and digital competence. However, successful use of ICT requires teachers to be provided with sufficient support to adapt to technological change and integrate ICT into their classes to improve quality of teaching and learning. Changes to how teaching is conducted have involved a shift from traditional classroom settings, where the teacher is seen as the source of information, to student-centred learning (SCL) (European Commission, 2019; Lewin & McNicol, 2015; McKnight et al., 2016). SCL gives students greater opportunity to actively participate in classroom practices, while the teacher's role has changed to become a facilitator for students to learn (Crumly, 2014; Starkey, 2019). Using ICT for student-centred classroom activities is thus in line with the recommended learning environments and working methods for HE in Finland (Elorinne et al., 2017; Finnish National Board of Education, 2014). Previous studies have shown that the adoption of ICT helps both students' learning outcomes and the development of 21st century skills in SCL practices (Chen & Yang, 2019; Wong & Li, 2011). Thus, successful use of ICT for educational purposes depends on several different conditions and requires teachers to be provided with professional training and opportunities for collegial exchange and sharing of ICT practices (Wong & Li, 2011; Zhang et al., 2021).

ICT in HE has been investigated internationally, in countries such as Hong Kong, Nigeria and Estonia. It was found mainly to be used in a teacher-directed way and less for supporting students active use (Bridget, 2016; Lau & Albion, 2010; Veeber et al., 2017). A qualitative study (Veeber et al., 2017), reported Estonian HE teachers' potential uses, as for example for illustrating purposes, for students' presentations, and for source of information and communication. Although the aim of use was not in focus, the study revealed that ICT was used for facilitating teachers' own work and for supporting students' motivation. In a Norwegian study, HE teachers used digital tools mainly to introduce variety to classes and, to lesser extent, increase motivation, creativity and cooperation. Studies have also confirmed that wikis can be utilised in HE to foster communication and collaboration, and podcasting to support creativity in the kitchen (Lai & Lum, 2012; Surgenor et al., 2016). In the Finnish context, previous studies have shown that HE teachers use ICT quite infrequently to support pupils' learning (Sundqvist et al., 2020a; Tanhua-Piiroinen et al., 2016). A quantitative study (Sundqvist et al., 2020a) of ICT use by Finnish HE teachers, identified three purposes of use: for cooperation, for facilitating pupils' learning, and for administration and lesson planning. Although the literature recognises the importance of ICT in everyday life (Haveri, 2009; Hölttä, 2014; Poirier et al., 2017), there are still few published studies about its use in HE.

Despite this, numerous studies and several approaches have investigated factors influencing teachers' ICT use in general. Quantitative studies have used causal models to reveal relationships between ICT use and factors such as ICT infrastructure, support, demographics, digital competence, teachers' attitudes, beliefs, and between-school differences (Drossel et al., 2017; Farjon et al., 2019; Gerick et al., 2017; Gil-Flores et al., 2017; Hatlevik, 2017; Inan & Lowther, 2010; Vanderline et al., 2014). Studies on the role of beliefs towards ICT use have shown it to be a quite complex subject, although quantitative studies have noted the role of these in ICT practice. Alignments have further been

identified between pedagogical and ICT-related beliefs and ICT integration practices (Ding et al., 2019; Kim et al., 2013).

ICT use is seen as a complex process (OECD, 2019), and during the last decade there have been various qualitative studies that aim to present a more descriptive and nuanced understanding of its use by teachers (Lawrence & Taar, 2018). A study by Razak et al. (2018) found that successful ICT use relied on several conditions related to the ICT tools available, division of labour and school rules and regulations that shape ICT culture. Some researchers have also taken a teacher's perspective and analysed their beliefs and perceptions in relation to their use of ICT. Teachers' perceptions of the challenges of ICT use further relate to aspects of competence, ICT infrastructure, learning materials, time, curricula, policies and the subject being taught (Erixon, 2010; Lindberg et al., 2017; Tallvid, 2016). Overall, these studies clearly indicate that teachers' ICT use is influenced by various factors; but still, little is evident about its use by HE teachers.

**Social cognitive theory**

To get a better understanding of HE teachers' ICT use, social cognitive theory (SCT) drawing on the model of triadic reciprocal causation (Figure 1) is used as a lens in this study. This theory focuses on human development and addresses knowledge acquisition and the regulation of human behaviour (Bandura, 1986). Human behaviour is explained in terms of triadic reciprocal causation, meaning that behaviour is part of a triadic system in which behavioural, personal and environmental determinants mutually influence each other. Translating this theory into the field of ICT in education, the way teachers use ICT is part of a constant interplay between personal and environmental influences. Personal factors refer to cognitive, affective and biological elements such as personal characteristics, skills, expectations, beliefs, self-perception, goals and intentions (Bandura, 1986, 1989). Environmental factors are created by human activity and can include both physical and social environments. Within SCT, environment is emphasised as a non-fixed entity, which means that some aspects of it will always have an influence on the individual at some level, while other aspects will have an influence only when they are activated by a specific behaviour. Environment can thus have a role both as an inhibiting and an encouraging factor on a person's development and functioning. The strength of these influences on behaviour varies depending on the individual and circumstances. In some cases, an environmental component functions as a strong barrier to a specific behaviour; in others, personal factors have a predominant influence on behaviour (Bandura, 1986).

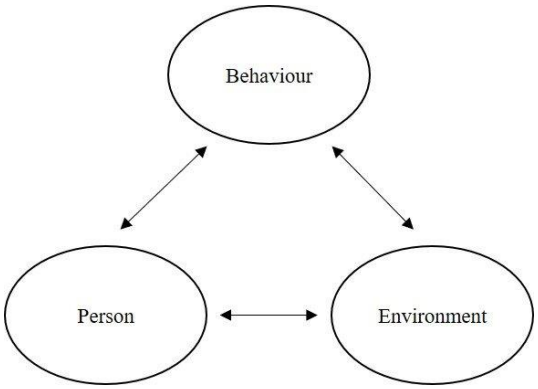


**Figure 1** **Theoretical Research Model Adapted From Bandura's Model of Triadic Reciprocal Determinism (Bandura, 1986, p. 24)**

In regard to behavioural patterns and their interactive relations to environmental events and personal regulators, SCT acknowledges that humans are not passive objects shaped by different factors. The influences are conditional of each other and do not function autonomously. Further, Bandura emphasised self-regulatory mechanisms as an important element of causal processes and set them at the base of the theory of triadic reciprocal determinism. Within this mechanism, people have the capability to exercise some control over their own thoughts, feelings and behaviour, for instance through activities requiring forethought such as goal setting (Bandura, 1986, 1991). People set goals and engage in activities that most likely lead to positive outcomes. This leads to a motivation to act and creates beliefs in the effect of an action. However, goals do not directly guide behaviour. Instead, they activate self-influences, which in turn are affected by the characteristics of the goals. People who set no goals for themselves will have difficulty monitoring their own behaviour. Conversely,

people who set themselves challenging goals have more interest and motivation to take strides to fulfil them. Such efforts mean shaping cognitive and environmental conditions to fit one's own purposes (Bandura, 2001). Bandura also emphasised the role of performance feedback. Without knowing how one is performing, a goal would simply not have a motivational effect on one's actions. The same behaviour can serve different goals, and it should not be analysed by excluding goals (Bandura, 1986, 1991). This study is limited to the analysis of HE teachers' use of ICT, their goals through using it and factors that have influenced this adoption. SCT enables emphasis to be placed on the bidirectional notion of interactions, since teachers are provided with opportunities to both reflect on factors associated with their ICT use and on their actions and practices, which in turn allow other influences to emerge.

## Methodology

### Research design

In this study, we employ an abductive research approach (Kirppendorff, 2004) that moves back and forth between inductive and deductive approaches. In the initial phase, deductive reasoning enables the development of an interview instrument by considering facts and observations from previous research and by formulating a research question based of the theory of triadic reciprocal determinism. In the analysis phase, an inductive approach allows discovery of new dimensions of importance, while a deductive approach provides a more descriptive understanding of well-known factors influencing HE teachers' use of ICT. In the final phase, we assess and discuss the results through the lens of Bandura's triadic reciprocal causation model to provide new insights.

### Participants and data collection

The sample consisted of 12 qualified HE teachers (11 women, 1 man) working in lower secondary education in Finland. One teacher had less than 5 years' teaching experience, 3 teachers had 5–10 years' experience and 8 had more than 10 years' experience. Purposeful stratified sampling methods were applied to provide rich information and major variations in cases (Patton, 2002). The HE teachers were randomly selected based on three pre-identified profile groups (frequent ICT users, specific ICT users, infrequent ICT users) with similar characteristics of ICT use (Sundqvist et al., 2020a). Semi-structured interviews were performed online via Zoom ($n$ = 10) or face-to-face at the teachers' workplace ($n$ = 2). Both in advance and at the beginning of their interviews, the participants were provided details about the aims of the study, how the data would be processed and the ethical principles guiding the research (Finnish National Board on Research Integrity TENK, 2019). The interview questions encouraged the informants to discuss important research issues in a conversational, loose but focused manner (Adams, 2015). Each interview started with background questions, which were followed by questions about the participant's use of ICT, goals and influences. Further, the interview included elements noted by previous studies in the field (Sundqvist et al., 2020a, 2020b) as being significant for a deep understanding of HE teachers' ICT use. Three pilot studies were conducted and, as a result, some minor changes were made to the interview questions. The interviews, which were audio-recorded, lasted about 40–70 minutes and were transcribed by the researcher verbatim (Kvale & Brinkmann, 2009).

### Data analysis

The data were analysed by adopting an abductive approach to qualitative content analysis with Nvivo12 software (Elo & Kyngäs, 2008; Kirppendorff, 2004). During the analysis, some of the main steps suggested by Erlingsson and Brysiewicz (2017) were followed in cycles. The first phase involved familiarisation with the data, and the transcribed text was read closely several times over to provide a sense of its insight. A deductive approach was applied to create themes based on the three-fold research question. The next two phases involved dividing up the text into meaning units and formulating codes. The text was broken down into these meaning units and labelled with preliminary codes that were derived directly and inductively from the text. The researchers carefully compared the codes to identify similarities and differences. The final phase involved the development of categories and themes. The codes were grouped together to develop sub-categories and main categories. The results were interpreted, and to ensure the trustworthiness and quality of the process, the data were rechecked several times and the categories were continuously cross-checked by another author. At the end of the process, the results were reflected against the model of triadic reciprocal determinism to provide a deep understanding of HE teachers' ICT use.

## Results

The findings were reported in relation to the three-fold research question—use of ICT, goals for its use, and influences for its adoption. The inductive analysis is based on HE teachers' responses to both open-ended questions and more direct questions on their perception of the usefulness of ICT, their digital competence and the support they receive. These responses were illustrated with extracts from the raw data and translated by the authors from Swedish and Finnish into English, correcting for grammatical errors without losing the original meaning.

### Goals for use

In the interviews, the teachers were asked about their goals for ICT use. However, two teachers did not respond to the question after it had been missed out by the researcher. The HE teachers' ICT use was categorised into two main categories and five sub-categories (Table 1).

**Table 1 Goals for Use**

| Categories | Teachers (*n* = 10) | Sub-categories | Teachers (*n* = 10) |
|---|---|---|---|
| Supporting students' learning | 8 | Increasing students' attention, motivation and interest | 7 |
| | | Supporting students' understanding of concepts and topics | 3 |
| | | Supporting students' engagement and self-awareness | 3 |
| Supporting teachers' work | 2 | Supporting teachers' instructional work | 1 |
| | | Increasing teachers' motivation | 1 |

*Supporting students' learning*

The goal of supporting students' learning was shared by eight teachers. Most commonly, teachers said they use ICT to increase their students' attention, motivation and interest. One teacher briefly explained the relationship between learning and use of ICT to increase attention:

> It grabs their attention. If I just talked and they did not see pictures, a lot of the teaching would pass them by. (Interview 6)

Some teachers said they use ICT to support their students' understanding of difficult concepts and topics by enabling visualisation techniques such as videos and illustrative programs. ICT is also used to enhance students' engagement and self-awareness, while some teachers talked about the importance of using it to empower their students to take greater responsibility and learn to use the knowledge that they themselves have gathered.

*Supporting teachers' work*

Only two teachers explicitly spoke about using ICT to support their own work. One felt that ICT has a motivational impact on his work, while the other one stated that:

> The aim of ICT is to facilitate our everyday lives; that is, I have used ICT to our advantage completely … All the material is in one place. As a teacher, I do not have to search for and wonder where something is. (Interview 9)

This view is thus related to the aim of using ICT for supporting teachers' instructional work.

### ICT use

Closely related to the goals of ICT use, teachers were also asked about their experience of using ICT in teaching HE, and further to explain how they had implemented it. As a result of the analysis, three main categories and six sub-categories were identified (Table 2).

**Table 2 ICT Use**

| Categories | Teachers (n = 12) | Sub-categories | Teachers (n = 12) |
|---|---|---|---|
| Students' active use | 12 | Searching and creating content | 12 |
| | | Formative assessment | 6 |
| | | Communication and interaction | 4 |
| Teacher-directed use | 11 | Presenting and visualising information | 11 |
| | | Archiving and providing learning materials | 8 |
| | | Summative assessment | 5 |
| Cross-curricular use | 3 | | |

*Students' active use*

All the teachers said they give their students the opportunity to actively use ICT to varying degrees and provide them with tools to create, search for, manage and store content. Most teachers utilise ICT in this way between once a month and once a year, which indicated quite infrequent use. The tools provided, and the content created, also differ greatly among them. Most commonly, students create different kinds of presentations using applications such as Sway, PowerPoint, OneNote, Keynote or Pages. One teacher described this as follows:

> Chromebooks are first picked up and then, in International Cooking, for instance, the students in pairs search for information about a country of their choice and then share it via OneDrive. (Interview 1)

The teachers also use ICT to create other types of content, such as video learning materials, comics, animations and posters, while it is less common for students to utilise ICT for home assignments. Six teachers said they use formative assessment methods such as quizzes and diaries, allowing students to reflect on and evaluate their own learning. Finally, some teachers use ICT for students' communication and interaction, for example through Instagram, while others use it for mediated student content interaction, for example with QR codes and digital learning platforms.

*Teacher-directed use*

Almost all teachers said they use ICT in a teacher-directed way, and most of them do so for presenting and visualising information and learning materials. Video clips are utilised to visualise different practice-orientated tasks, such as cooking and cleaning processes, while digital presentations and slides are used to deliver practical instructions and transmit learning content to students in a traditional way. Eight teachers said they use ICT for archiving and providing students with learning materials, and a variety of platforms are used, such as blogs, web pages, e-books and cloud storage infrastructure offered by the school. For example, one teacher explained her use of Teams in teaching:

> I post documents that the students need and test answers, and if they are rehearsing for an exam, they read the documents on Teams… Also, when students have created presentations, I collect them all there. (Interview 10)

Some teachers give students access to materials at home. When learning material is not accessible from home, the teachers make it available in class. In the latter case, students have booklets or folders in which all essential material is stored. Finally, some teachers use online tools such as Google Forms and Socrative for summative assessment, although some view it as problematic for various reasons.

*Cross-curricular use*

Three teachers said they have implemented cross-curricular use of ICT to enable students' participation in multidisciplinary projects between school subjects:

> Two years ago, a multidisciplinary learning unit team planned modules so that the seventh, eighth and ninth graders had their own themes. The seventh graders had fish as their theme, which include the subjects of biology, chemistry and home economics… Every subject had its own tasks that were completed during class time. Based on these tasks, the students compiled different info packages or studies, which were then uploaded to OneNote. (Interview 11)

To support this type of work, teachers and students use different Office 365 applications and digital devices such as laptops, mobile phones and Chromebooks.

## Influences

The dimensions of influences associated with HE teachers' ICT use are presented in Table 3 and described in the text below. The inductive analysis resulted in six main categories and 20 sub-categories.

**Table 3 Influences**

| Categories | Teachers (n = 12) | Sub-categories | Teachers (n = 12) |
|---|---|---|---|
| ICT infrastructure | 11 | Tool availability | 11 |
| | | Application software | 4 |
| | | Internet access | 4 |
| Organisational factors | 11 | Technical and ethical safety issues | 6 |
| | | Time constraints | 4 |
| | | Financial resources | 3 |
| | | Instructional facilities | 3 |
| Support | 9 | Shared practices and collegial support | 5 |
| | | Support from school | 4 |
| | | ICT teacher training | 3 |
| Teaching factors | 12 | Teachers' digital skills | 10 |
| | | Personal interest and motivation | 8 |
| | | Teachers' beliefs | 6 |
| | | Teachers' own time and effort | 5 |
| | | Teacher characteristics | 2 |
| Subject culture | 4 | Students' expectations | 3 |
| | | Curriculum | 1 |
| | | Status of the subject | 1 |
| Student factors | 3 | Students' ICT behaviour | 2 |
| | | Students' ICT skills | 1 |

## ICT infrastructure

Eleven teachers acknowledged ICT infrastructure to be either a barrier or facilitator for use, or both. The teachers who highlighted sufficient ICT infrastructure as an important facilitator for use, focus especially on digital tools. One teacher, for instance, reflected on digital tools in relation to usefulness of such tools for their own work, while others mentioned the important role of internet access and functional applications. This is how one teacher stressed the importance of digital devices:

> All teachers who wanted them got their own Chromebooks, and this has facilitated work and note-taking enormously. (Interview 11)

Teachers who said they experience ICT infrastructure as a barrier face challenges with poor internet connectivity and scarcity of working devices and software. The ability to book out devices is also a challenge faced by some teachers. Planning their use far in advance, managing the iPad cart and keeping track of cables were said to be challenging and time consuming. Further, some teachers face difficulties in the use of applications when teaching; when this problem goes unsolved, the applications remain unused.

*Organisational factors*

Multiple organisational influences were put forward by the teachers, who identified various technical and ethical safety issues that have a negative influence on their ICT use and an indirect link to their level of interest in it and motivation to adopt it:

> I do not like using tablets in HE… For example, today we made buns. What would the tablets have looked like after doing all that baking? (Interview 7)

In addition to the risky use of devices in the kitchen, ICT raises other issues, such as cyberbullying and sharing inappropriate content, while time constraints were highlighted by four teachers as another drawback for using ICT in HE. They touched on the limited amount of lesson time given over to HE and the length of lessons. In addition, three teachers said that inadequate instructional facilities are also a major barrier. One felt that the use of ICT in the classroom is too clumsy and impractical, and the available devices and cables cannot be organised in a practical and functional way. Finally, lack of financial resources was identified as an organisational factor that has negatively influenced their adoption of ICT by limiting equipment procurement and training.

*Support*

Most teachers noted the importance of collegial support and shared practices, availability of support from schools and the provision of ICT training for teachers. Some variously touched on the benefits of planning joint ICT use with colleagues and their desire to share ICT practices with other colleagues, although a lack of this type of collaboration was noted. One teacher voiced approval for the support they had received from their school, which had provided a digital tutor, although another had felt overwhelmed by the amount of information on ICT provided. Teachers who had received enough technical and pedagogical support when they needed it were especially satisfied. In contrast, some teachers touched on schedule difficulties and time constraints obstacles to taking advantage of the support provided by their schools. One teacher also pointed out that prolonged resistance from colleagues and school management would eventually lead to declining interest in ICT. Another emphasised the relationship between support provided, skills gained and increased personal interest towards ICT use:

> After all … it also been [my] desire to learn. Ever since our municipality started offering ICT teacher training, I have grasped the opportunity. This is one thing that needs to be mastered. (Interview 9)

The teachers noted a variety of considerations that need to be made when providing teacher training in ICT, such as adjusted levels of difficulty, the provision of follow-up training and content relevant to teachers' wishes. Most teachers wanted training to address practical and pedagogical means to implement ICT in HE by taking into account their lesson structures, and also how different devices and applications should be used.

*Teaching factors*

The teachers stated that their own digital skills had an impact on their use of ICT. In analysing HE teachers' perception of their digital skills, the result show that five teachers perceive having great digital skills, four teachers of having basic digital skills and two of having poor digital skills. Eight teachers also highlighted their personal interest and motivation as being important indirect influences for their ICT adoption. They pointed out that these factors might be linked to their age, background of ICT use and ability to develop ICT skills. However, lack of interest and motivation may lead to devices being left unused in the classroom and the decision not to spend time on skills development. Some teachers talked about the nature of HE and highlighted the importance of preserving the practical nature of the subject, which also meant emphasising traditional hands-on skills instead of increasing ICT use:

> I would rather stick with these traditional, hands-on and collaborative skills and teach without having to keep an eye on Chromebooks. (Interview 1)

This again revealed an interplay between teachers' beliefs and technical and ethical safety issues. Some teachers recognised ICT use as being a life skill, and also noted the importance of using it in HE teaching and learning. Belief in the usefulness of ICT was also recognised as being important in this way. For instance, one teacher expressed her view that ICT is not particularly important in HE, and pointed to her own limited use of it. When specifically asked about their perceived usefulness of ICT in HE, the teachers said that it supported both their own work and their students' learning; however, some did not see is relevance in helping them to achieve their learning objectives, relative to their view that HE should remain a practical subject. Teachers' available time and the effort required also hinder their ICT use. They felt that they lacked time and energy to plan meaningful ICT use and participate in training. Characteristics of age, prior experience and education were also voiced as important influences when discussing ICT use.

*Subject culture*

Several aspects linked to subject culture emerged as being of important for HE teachers' ICT use. These included students' expectations, subject priority settings and breadth of the curriculum. For some teachers, students' expectations are so important that they influence how much they prioritised ICT use:

> The students would be extremely disappointed if we spent two hours on the computer and did nothing practical. I prefer to keep this as a practical subject, instead of one focused on theory." (Interview 7)

The general perception of HE as a low-priority subject was something one teacher pointed out as being a factor limiting the purchase of resources. Another stated that the curriculum is so broad that teaching can be influenced by one's own personal interests.

*Student-level factors*

Student-level factors were related to students' ICT behaviour and skills. Two teachers felt frustrated about the behaviour of some of their students who have been found using devices to play games and surf on the internet during class. For example, one teacher said:

> Some of the boys are not on the right page to do the tasks; instead they are on another website… The biggest problem is the fact that that it immediately happens when you turn your back… They are faster at using ICT and computers than me. (Interview 8)

Students' lack of digital skills also partly influenced one teacher's ICT adoption, saying that it would take a great deal of time for their students even to turn on their computers.

## Discussion

The aim of this study is to investigate Finnish HE teachers' use of ICT, using social cognitive theory and drawing on the model of triadic reciprocal causation to enhance understanding of it. Further, the study sets out to provide new insight into how HE teachers' use of ICT should be supported as a means to support student learning.

First, we will discuss findings related to HE teachers' goals and ICT use through Bandura's goal-setting concept through the model of reciprocal determinism (Figure 2), which is treated as a personal factor and one of self-regulating mechanisms that functions as a mediator between external influences and behaviour. Although the function of self-set goals cannot be distinguished as a main element in the three-point model itself, Bandura states that these can have a self-motivating influence on behaviour. Further, people who set goals for themselves also find it easier to monitor behaviour by clarifying conditional requirements (Bandura, 1986, 1991). When HE teachers were asked to report their goals through ICT, they primarily reflected on using it to support students' learning, and to some extent to support their own work. They especially highlighted students' attention, motivation and interest. These results are partly supported by previous research, such as the study by Veeber et al. (2017) and Beinert et al. (2020). However, we noted that HE teachers had difficulty in expressing their own goals, often repeating the way that ICT is used, instead of describing their aims. Some misalignments between aims of use and actual use were also found. While HE teachers' goals for the main part targeted student learning, they reported implementing it in both student- and a teacher-directed

ways. More specifically, ICT was adopted for students' active use, teacher-directed use and cross-curricular use, with the first two consistent with the study of Veeber et al. (2017). All HE teachers used ICT for students' active use, which is in line with the recommended approach of SCL to teaching (Crumly, 2014; Starkey, 2019). However, supporting active learning was not at the core of HE teachers' goals. This indicates that their ICT use is not entirely goal-directed, and in relation to the self-regulating concept of goalsetting (Bandura, 1986), they may have difficulty in self-observing and evaluating their own performance. Thus, limited awareness of what one is doing makes it difficult to set goals for one's actions. The goals themselves are important for adapting behaviour by specifying the conditions required to use ICT in a way that brings positive outcomes. HE teachers who expressed their goal was to support students' engagement and self-awareness would more likely make greater efforts to create conditions for implementing ICT that would achieve this aim. Many of these conditions were identified in this study and should be further discussed in relation to Bandura's model of triadic reciprocal determinism.

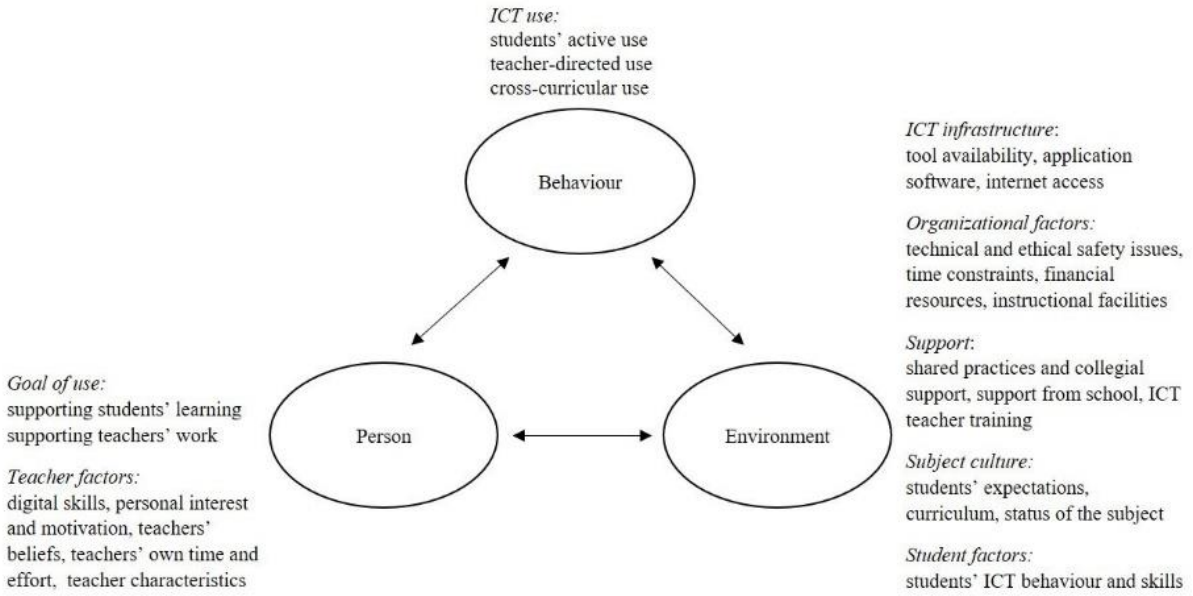


**Figure 2 Results Related to Bandura's Model of Triadic Reciprocal Determinism**

Because personal, behavioural and environmental influences function as reciprocal determinisms of each other, it is not appropriate to discuss these separately. Therefore, the identified influences positioned in the environmental and personal levels in Bandura's model (Figure 2) are mostly discussed as conditional of each other. We start by discussing the influences related to HE teachers' use, positioned as *environmental factors* in the model (Figure 2) and also supported by previous research (Drossel et al., 2017; Gerick et al., 2017; Gil-Flores et al., 2017; Inan & Lowther, 2010; Lindberg et al., 2017; Razak et al., 2018; Tallvid, 2016).

A majority of HE teachers noted the importance of ICT infrastructure, and more specifically, the availability of devices, software and internet access. Issues in booking devices is one unexpected barrier that some HE teachers encountered, although this was also observed in the study by Erixon (2010). HE teachers are thus still in need of adequate software and digital devices that are readily available for their classes. In terms of organisational factors, challenges with time limitations and perceptions that HE classrooms are not suitable for digital tools are two factors that stand out. The latter is linked to teachers' interest, motivation and beliefs. A fear of damaging a device in the kitchen is, for instance, associated with reduced motivation for using it. Reticence towards using ICT further relates to the importance of preserving the practical nature of HE. This relates to the bidirectional causality in personal and environmental factors in Bandura's model and his statement that environment does not directly impinge on people's behaviour. Environmental influences operate alongside cognitive and personal influences such as beliefs and competencies (Bandura, 1986). These

findings therefore show the relevance of analysing subject-specific beliefs and other cognitive influences related to ICT use (Ding et al., 2019).

In relation to the environmental factor of support, the findings are in line with the study of Sundqvist et al. (2020b), who found a link between HE teachers' use of ICT and the support they are given to implement it. HE teachers value collegial support and wish for opportunities to share practices, which are important factors contributing to teachers' successful ICT use in implementing student-centred instructional practices (Wong & Li, 2011; Zhang et al., 2021). Even though various forms of support have been highlighted in previous work (cf. Inan & Lowther, 2010), it is important to specify the delivery and content of such support. In accordance with our findings, HE teachers should be offered subject-specific teacher training focused on pedagogical ICT practices, tips and concrete ideas with opportunities to follow-up. Support should further be offered immediately as a problem arises, for example by a tutor at the school. The findings also showed that support is connected to HE teachers' motivation, interest and digital skills, which further show a relation between environmental, personal and behavioural influences (cf. Sundqvist et al., 2020b). Teachers participate in ICT training to develop their skills when they are interested and motivated. Having enough time, effort, motivation and interest either hindered or facilitated most of the teachers' ICT use. This again shows how the complexity of several interactional influences can influence behaviour according to Bandura's model. HE teachers' lack of interest and motivation in participating in ICT training and developing their digital skills leads to more limited use of ICT and a feeling of lack of support. This relates to Bandura's (1989) statement that behaviour changes environmental conditions and is further changed by the conditions it creates. Subject culture and student factors were also identified as environmental factors. Subject culture focuses mostly on students' expectations, but also on the breadth of curriculum and low status of the subject. Aspects related to subject culture also appeared in the study by Erixon (2010), who found that HE teachers are afraid that the subject will lose its attraction if more ICT were applied. Although this study does not address mechanisms of cultural change, these are further important aspects to address.

We will now discuss influences positioned as *personal factors* in Banduras model. We have already touched upon influences such as digital skills, personal interest and motivation, and to some extent teachers' beliefs, time availability and willingness to apply effort. In relation to their beliefs, and consistent with previous research (Sundqvist et al.,, 2020a), the perceived usefulness of ICT in HE is identified as an influence. A belief that ICT does not play a major role in achieving the learning objectives of HE is also related to a viewpoint that HE should remain practical. This finding is supported by Erixon (2010), who stated that HE teachers wish to retain the practical nature of the subject, instead of incorporating ICT into teaching. Conversely, HE teachers who perceive ICT as an everyday skill find more use for ICT. The alignment between subject-specific beliefs, perceived usefulness and ICT use is partly in line with the results of Ding et al. (2019), who found a relationship between content-specific pedagogical beliefs and ICT practices. This again raises the importance of cognitive functioning and attitudes guiding behaviour (Bandura, 1986).

## Limitations and further research

Our understanding of HE teachers' ICT use is mostly based on analysing use, goals and influences in separate phases; meanwhile, Bandura's (1986) notion of reciprocal determinism is based on behavioural, personal and environmental factors that exert mutual influences onto each other. Limited analysis of the multiplicity of interactions between these influences is therefore a weakness in this study. Another weakness is our ambition to address only the forethought perspective of goalsetting, while Bandura (2001) reported other perspectives of importance, such as outcome expectations. Consequently, further research utilising other methodological and analytical approaches could be useful for investigating relationships between the influences identified in this study and teachers' ICT use. Since goals also partly direct behaviour, and a misalignment between HE teachers' aims of use and actual use appeared in this study, it could be interesting to explore the extent to which HE teachers' goals mediate the environmental and personal influences on their use. However, we did not find Bandura's model useful for understanding all forms of influence, especially those of subject culture and teachers' beliefs. Further research is thus needed to understand HE teachers' beliefs when teaching and the extent to which beliefs and culture influence HE teachers' use of ICT.

## Conclusions

In this study, we looked through the lens of Bandura's theory of reciprocal determinism to enhance our understanding of the influences related to HE teachers' ICT use and their goals for its use. The results show that their ICT use not only depends on their goals, but also on influences identified at the environmental and personal level of Bandura's model. The interplay between these influences is, however, complex and difficult to grasp. The findings from their expressed aims indicate that HE teachers need to be supported in setting goals for their ICT use. According to Bandura (1986, 1991), people need to be aware of and pay attention to the role of their own performance in influencing motivation towards a specific behaviour. Being aware of one's own performance supports goal setting which in turn increases determination to achieve self-set goals. Further, this also means that support should be organised in a way that feedback is provided on how teachers are using ICT, thereby helping them to set goals in this regard. This, in turn, increases teachers' motivation and interest in developing their adoption of ICT by clarifying conditional requirements. Based on the results of this study, this means making efforts to provide HE teachers with support to develop their digital skills, demand proper ICT infrastructure and support shared practices between colleagues and finally follow-up teacher training that focuses on the teachers' requirements.

## Disclosure Statement

No potential conflict of interest was reported by the authors.

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