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Marjo Joshi

Holistic Design of Online Degree Programmes in Higher Education

A Pedagogically Informed Design Framework



MARJO JOSHI

**Holistic Design of
Online Degree Programmes
in Higher Education**
– A Pedagogically Informed Design Framework

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ABSTRACT

Marjo Joshi

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Globalisation, digitalisation and future visions are placing new demands to redesign higher education. The main aim of this dissertation is to create a framework and accompanying design principles for the pedagogically informed holistic design of online degree programmes in higher education to create meaningful learning experiences. The site of the study is a higher education organisation in Finland. The study focuses on the design of online degree programmes as a new type of education in a digitally competent organisation that utilises a pedagogical strategy in all its educational activities and services. The study aims to expand the understanding of online degree programme design in local, national and international online contexts. The methodology used is design-based research.

The framework is based on theoretical and empirical data collected in four sub-studies, each of which includes one cycle with one or more phases that were reported in a separate article. The framework considers pedagogical issues throughout the design, thus being pedagogically informed. The first sub-study was qualitative and consisted of three phases to set the basis for the construction of online degree programmes as a new type of education in the university of applied sciences as the site of the study. The initial model was based on a literature search on online degree programme design, integration of the pedagogical strategy of the higher education organisation and expert consultations within the organisation to ensure that the pedagogy could be implemented as intended in the digitally competent organisation. The resulting model presented the design elements and principles on three design levels: Organisational, Pedagogical and Online degree programme.

The second sub-study was qualitative and focused on teachers as designers and practitioners of pedagogy. The sub-study investigated the experiences that the first online degree programme teachers in the higher education organisation had of the initial design model. Based on their experiences, the model was refined and a new set of design principles focusing on the support for teachers in the online degree

programme context were created. The third sub-study examined the experiences of the online degree programme students as the end-users of the intended pedagogy in the context of an international online degree programme. Their views on the international and intercultural aspects of online degree studying were collected through mixed methods. Based on their experiences, design principles for designing international online degree programmes in higher education were created and the model was further refined.

The fourth sub-study focused on the national context of online degree programme design for cross-studies. Mixed methods were used to collect experiences from a national online degree working group to determine how sustainable development could be integrated in the online degree programme design. Based on the results, design principles for integration of sustainable development in the online degree programmes were created. Finally, in this study, the resulting model was informed by service design. Four levels of service design were used to design online degree programmes as a new type of education to create useful and meaningful learning experiences. Based on the results, the final holistic framework was created.

This design-based research study contributes to theoretical knowledge on online learning and design research in higher education. The framework also provides insights into inclusive design and supporting teachers and students in the new type of education. In addition, it produces new information about the integration of sustainable development in online degree programme design. Based on the results, the dissertation discusses the implications for organisations and practitioners in higher education. Suggestions about the use of the framework and further research are made.

The main contribution of this dissertation is the design framework with accompanying design principles. The framework includes 15 design elements on three design layers: Organisational, Pedagogical and Online degree programme, which also include the service design levels of processes and features, experiences and strategies. The design elements provide organisations and practitioners with the key characteristics of the holistic design. The accompanying principles offer further guidance to organisations and practitioners in the planning of appropriate actions and in engaging key personnel to design online degree programmes as a new type of education in higher education.

Key words: Online degree programmes, holistic design, pedagogy, higher education, design-based research

TIIVISTELMÄ

Marjo Joshi

Verkkotutkintojen holistinen suunnittelu korkeakoulutuksessa

– pedagogiikan huomioiva viitekehys

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Globalisaatio, digitalisaatio ja tulevaisuuden visiot asettavat uusia vaatimuksia korkeakoulutuksen suunnittelulle. Tämän väitöskirjan pääasiallinen tavoite on luoda viitekehys ja sitä tukevat suunnitteluperiaatteet verkkotutkintojen pedagogisesti suunnattuun holistiseen suunnitteluun korkeakoulutuksessa merkityksellisten oppimiskokemusten luomista varten. Tutkimus sijoittuu suomalaiseen ammattikorkeakouluun. Tässä tutkimuksessa termiä 'holistinen' käytetään kuvaamaan kokonaisvaltaista näkökulmaa suunnitteluun. Tutkimuksen kohteena on verkkotutkintojen rakentaminen uudenaikaisena opiskelumuotona digitaalisesti kyvykkäässä organisaatiossa, joka noudattaa pedagogista strategiaa kaikessa opetuksessa ja toiminnoissaan. Tutkimuksessa käytetään design-perustaisen tutkimuksen menetelmää ja sen tarkoituksena on laajentaa ymmärrystä verkkotutkintojen suunnittelusta paikallisissa, kansallisissa ja kansainvälisissä konteksteissa.

Viitekehys perustuu teoreettiseen ja empiiriseen dataan. Data kerättiin neljässä osatutkimuksessa, joista kukin raportoitiin omana artikkelinaan. Jokaisessa osatutkimuksessa oli yksi sykli, joka koostui yhdestä tai useammasta vaiheesta. Viitekehys keskittyy pedagogisiin näkökulmiin suunnittelun jokaisella tasolla, mikä tekee viitekehuksesta pedagogiikan huomioivan. Ensimmäinen osatutkimus oli laadullinen ja koostui kolmesta vaiheesta, jotka loivat perustan verkkotutkintojen rakentamiselle uudentyyppisenä koulutusmuotona organisaatiossa. Alustava malli perustui teoreettiseen taustakirjallisuuteen, pedagogisen strategian integrointiin ja asiantuntijakonsultaatioihin organisaatiossa. Tavoitteena oli varmistaa, että pedagoginen lähestymistapa voitiin toteuttaa suunnitellusti digitaalisesti kyvykkäässä organisaatiossa. Tuloksena oli malli, jossa esitettiin suunnitteluelementit ja -periaatteet suunnittelun kolmella tasolla: organisaatiotaso, pedagoginen taso ja verkkotutkintotaso.

Toinen osatutkimus oli laadullinen ja keskittyi opettajiin suunnittelijoina ja pedagogiikan toteuttajina. Osatutkimuksessa tarkasteltiin organisaation ensimmäisten verkkotutkinto-opettajien kokemuksia alustavasta mallista. Mallia kehitettiin

heidän kokemustensa perusteella. Lisäksi luotiin uusia suunnitteluperiaatteita, joiden avulla voidaan tukea opettajia verkkotutkintojen kontekstissa. Kolmannessa osatutkimuksessa tutkittiin kansainvälisessä verkkotutkinnossa opiskelevien opiskelijoiden kokemuksia pedagogiikan loppukäyttäjinä. Heidän näkemyksiään verkkotutkinto-opiskelun kansainvälisistä ja kulttuurienvälisistä seikoista kerättiin sekä kvantitatiivisin että kvalitatiivisin menetelmin. Alustavaa mallia muokattiin tulosten perusteella sekä luotiin periaatteet kansainvälisten verkkotutkintojen suunnittelulle.

Neljäs osatutkimus keskittyi verkkotutkintojen kehittämiseen ristiinopiskeluna kansallisessa yhteistyössä. Osatutkimuksessa kerättiin näkemyksiä kansallisen verkkotutkintotyöryhmän jäseniltä ja selvitettiin, miten kestävä kehityksen tavoitteita voitiin integroida verkkotutkintojen suunnitteluun. Tulosten perusteella alustavaa mallia ja suunnitteluperiaatteita muokattiin kestävä suunnittelun huomioimiseksi. Lopuksi neljän osatutkimuksen tuloksena tulleeseen malliin ja suunnitteluperiaatteisiin yhdistettiin tässä tutkimuksessa palvelumuotoilun neljä tasoa, jotta verkkotutkintojen suunnittelu uudentyypisenä koulutusmuotona tuottaisi hyödyllisiä ja merkityksellisiä oppimiskokemuksia korkeakoulujen verkkotutkinnoissa. Tulosten perusteella luotiin lopullinen holistinen viitekehys.

Tutkimus tuottaa teoreettista tietoa verkko-oppimisesta ja design-tutkimuksesta korkeakoulutuksessa. Lisäksi tutkimus tuottaa uutta tietoutta inklusiivisten verkkotutkintojen suunnittelusta ja laajentaa näkemyksiä opettajien ja opiskelijoiden tukemiseen uudenaikaisessa opiskelumudossa. Uutta tietoutta tuotetaan myös kestävä kehityksen periaatteiden huomioimiseen verkkotutkintojen suunnittelussa. Tulosten perusteella tuodaan esiin käytännön seurauksia organisaatioille, suunnittelijoille ja toteuttajille sekä suositellaan viitekehysten käyttömahdollisuuksia ja jatkotutkimuksen aiheita.

Tämän tutkimuksen pääasiallinen kontribuutio on suunnitteluviitekehys ja sitä tukevat suunnitteluperiaatteet. Viitekehys sisältää 15 suunnitteluelementtiä suunnittelun kolmella tasolla: organisaatiotaso, pedagoginen taso ja verkkotutkintotaso. Näihin tasoihin on integroitu palvelumuotoilun mukaiset prosessien, ominaisuuksien, kokemusten ja strategioiden suunnittelutasot. Suunnitteluelementit tarjoavat organisaatioille, verkkotutkintojen suunnittelijoille ja toteuttajille holistisen suunnittelun keskeiset ominaisuudet. Suunnitteluperiaatteet ohjaavat käytännön toteutuksen tarkoituksenmukaista suunnittelua ja soveltuvan henkilöstön osallistamista verkkotutkintojen suunnitteluun uudenlaisena koulutusmuotona.

Avainsanat: Verkkotutkinnot, holistinen suunnittelu, pedagogiikka, korkeakoulutus, design-perustainen tutkimus

To my family

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My career in online learning started when I began working as a teacher at Turku UAS in 2005 after relocating from London to Turku. I was asked if I would be interested in virtual teaching, as this was something new that needed to be explored more in the field of language teaching. One of my first most memorable online teaching experiences was teaching a group of Japanese businessmen, working for a Finnish company in Japan, via an online meeting platform Adobe Connect. This unique experience was later recorded in the book *Become an online teacher in a week* (Nurmela & Suominen, 2008). I quickly realised that online learning and technology in teaching was something that I was interested to explore more.

When I started my research in 2016, online degree programmes were not yet that common in Finnish higher education, giving new importance to this PhD study. However, the world of higher education in 2023 is quite different, not the least due to the recent COVID-19 pandemic, and online degree programmes do not seem to have the same novelty as they did earlier. Nevertheless, I believe that this research is perhaps even more topical and needed now than it was before the pandemic, as the results can hopefully benefit a wider audience and create better online learning experiences.

This study has allowed me to deepen my understanding of online learning design through academic research. For this, I would like to express my deepest gratitude to my supervisor, Professor Päivi Rasi-Heikkinen, from the University of Lapland. She is an incredible professional in the field of media pedagogy and it has been an honour to work with her. She has taught me so much about academic research and her guidance in the design-based research approach has been rewarding. Because of her valuable advice, I am a better researcher and was able to complete the research as planned.

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This study started with the commence of the first international online degree programme at Turku UAS, International Business (IB) Online. I want to acknowledge the Head of Education and Research Jaana Kallio-Gerlander, who gave me her full support and encouraged me to start my research on this important topic in my role as the coordinator of the IB Online. Working with IB Online was inspiring throughout the research. The staff and students were incredibly motivated and committed to developing the degree, and I am grateful for their participation in my research. I am extending this gratitude to the managers and staff of the other two new online degree programmes that commenced at the same time, Media Production and Social Services, for their participation and valuable contribution to my research.

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Life is an exciting journey, and this study is one path I have chosen to take. I am grateful for the learning, the experiences and the connections that I have gained along the way, and I look forward to continuing this journey with you all.

Turku, January 2023

Marjo Joshi

List of Original Articles

The dissertation is based on the following four original article publications, which will be referred to in the text as sub-studies by their Roman numerals I–IV. The original articles are attached at the end of this dissertation.

Sub-study I: Joshi, M.S. (2022). Holistic design of online degree programmes in higher education – a case study from Finland. *International Journal of Educational Management*, 36(1), 32-48. <https://doi.org/10.1108/IJEM-12-2020-0588>

Sub-study II: Joshi, M. & Kantola, M. (2022). Teachers' Experiences and Role in the Design Process of Online Degree Programmes in Higher Education. *Seminar.net*, 18(1). <https://doi.org/10.7577/seminar.4698>

Sub-study III: Joshi, M. & Varhelahti, M. (2022). Designing International Online Degree Programmes in Finnish Higher Education. *International Journal of Teaching and Learning in Higher Education*, 34(1), 45-59. <https://isetl.org/ijtlhe/pdf/IJTLHE4256.pdf>

Sub-study IV: Joshi, M. (2022). Sustainable development in the design of online degree programmes for national cross-studies. *Ammattikasvatuksen Aikakauskirja*, 23(4), 12–33. <https://doi.org/10.54329/akakk.113318>

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List of Abbreviations

ABBREVIATION	DEFINITION
DBR	Design-based research
DigCompOrg	Digitally competent organisation, a European conceptual framework for systematic integration of digital learning in educational organisations (Kampylis et al., 2015)
HE	Higher education
ODP	Online degree programme
SD	Sustainable development
UAS	University of applied sciences

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1 Introduction

The impacts of globalisation, digitalisation and future visions on society, work and higher education place demands on creating new types of higher education (HE) delivery modes. HE organisations are likely to extend the degree education offering to online mode (OECD, 2021), creating further research needs in e-learning and fully online HE degrees (Ghanem, 2020). In Finland, new solutions and approaches are needed at all levels of education to meet the demands of digitalization, internationalisation and the world of work to produce equitable and accessible education (Finnish Government, 2021a). The Finnish HE vision aims to create personalised and flexible study paths and degrees to all (The Ministry of Education and Culture, 2017). In addition, there is a need to increase the opportunities for continuous learning, digitalisation and internationalisation in HE (Finnish Government, 2021b). Online degree programmes (ODPs) can offer more flexible and accessible opportunities for gaining a HE degree.

The specific features and needs of the online context should be considered in the rigorous design, development and implementation of teaching and learning for the ODPs. It is important for the educational organisations to consider what type of online education fits their purposes (Naidu, 2017). A suitable combination of localisation, cultural adjustment and technological solutions is needed for choosing the online education delivery mode (Palvia et al., 2018). Online program design research is important because previous research on online education has largely focused on teaching and learning in online course design rather than that of entire programs (Kumar, 2014). Also, the acceptability of online degrees for gaining employment varies (Adams & de Fleur, 2006; Linardopoulos, 2012; Roberto & Johnson, 2019) and ODPs should be developed to have equal status to traditional campus-based degrees. Emphasis should be placed on the purposeful and pedagogical institutional conceptualization and construction to make ODPs a viable study option (Ragusa & Crampton, 2017). Quality should be considered in the design of ODPs (Benson, 2003; Rovai & Downey, 2010) and be based on planning, assessment and revision of the ODPs (Lockhart & Lacy, 2002). In Finland, there is a lack of research available on designing ODPs in HE. At the time of starting this study, ODPs were not that common in the Finnish HE (Joshi, 2022a; 2017), and no consistent terminology was available to define them (Joshi et al., 2022a).

This study aims to address these research needs by approaching the online degree programme (ODP) design from a pedagogically informed holistic point of view in Finnish HE. The main aim of this design-based research (DBR) study is to create a

framework and accompanying design principles that integrate the digital competence of the HE organisation and its pedagogical strategy with the specific requirements for ODP studies and services online to create meaningful learning experiences in HE. DBR was used as a research approach as it creates new knowledge about a topic and, through the iterative process of research-based intervention, results in design principles (Amiel & Reeves, 2008; Paavola et al., 2011; Laurillard, 2012) as a solution to a complex educational problem (Plomp, 2007). Service design perspective was included in this study as it can be used to create new services for specified groups (Joshi & Alavaikko, 2020). The aim of this study is approached through the main research question of “*What kind of model can be created for the pedagogically informed holistic design of online degree programmes in higher education?*”.

This DBR study is contextualised in HE research (Teichler, 2015) in Finland (Välilä, 2012). The theoretical contributions focus on online learning (Harasim, 2000) and ODP design (e.g. Kumar, 2014; Rovai & Downey, 2010) by combining the perspectives of the HE organisation’s digital competence (Kampylis et al., 2015) and pedagogical strategy (Harper & Vered, 2017; Konst & Kairisto-Mertanen, 2020) with levels of service design (Moritz, 2005). More specifically, the focus is on educational design research (Goodyear, 2005) in the holistic design (Kek & Huijser, 2017) of ODPs as a new type of education (Dill & Teixeira, 2000) in a digitally competent organisation that uses a pedagogical strategy.

Previous research has shown that HE organisations can utilise theories of distance education in the design of programmes to integrate technology in the design of flexible, structured, and supported community of instructors and peers (Saba, 2016). Therefore, this study also has confluences with distance learning, where online programmes have been provided for decades (Peters, 2001) and many similarities to online learning exist, such as infrastructure or delivery modes (Sener, 2002). In this study, in addition to theoretical literature, national education policy documents are used as a source of information. It has been identified that national policy documents and funding models have an influence on the HE development in Finland (Nenonen, 2020).

There is a lack of consistency in the terms related to online learning (Moore et al., 2011) and online learning can be considered synonymous with networked learning or e-learning (Goodyear, 2005), or as one variation of the term distance education, although today’s distance learning experience cannot be properly described by using the current terms (Johnston, 2020). Other similar terms include open or distributed learning that may include certificate programs and degree studies (Dabbagh, 2005). In Finnish HE, various terms are used to describe ODPs (Joshi et al., 2022a) and there is a lack of consistency in the use of terminology. In this study, the term ‘online degree programme’ (ODP) is used to describe a Bachelor level degree programme that is completed online, includes interactive elements and synchronous online meetings and the study is guided by teachers (Joshi et al., 2022a), and where a student

is required to complete all study credits completely online and the educational organisation offers all the support services, including student office services, library services and so on, fully online (Sener, 2002; 2015).

The key concept in this study is holistic design that refers to a design approach that is applied throughout the organisation, i.e., whole-of-institution approach (Kek & Huijser, 2017). The focus is on pedagogy in the design (Combe, 2005; Ragusa & Crampton, 2017; Jääskelä & Nissilä, 2015; Green et al., 2010; Rovai & Downey, 2010). A holistic approach in educational organisations ensures reaching the full benefits of the selected pedagogical approach (Harper & Vered, 2017) i.e., pedagogical strategy, which is considered in all operations, including learning and teaching, working life cooperation and curriculum design (Konst & Kairisto-Mertanen, 2020). In this study, the holistic approach extends to an integration of sustainable development in education and pedagogy (Sterling, 2003; Laininen, 2008; Rohweder & Virtanen, 2009; Lozano et al., 2017) and a provision of inclusive education that encompasses multiple perspectives, cultures, experiences, and ability for all students (Artiles et al., 2006; Bodhi et al., 2021). In this study, the holistic design includes determining the organisation's readiness to offer online education (Lockhart & Lacy, 2002) and ensuring a shared understanding of the learning environments (Moore et al., 2011). For this, the framework Digitally Competent Organisation (DigCompOrg) (Kampylis et al., 2015) is used. Thus, in this study, the term 'holistic' is used to refer to an approach where ODP design includes all educational and support services in the digital context of the HE organisation, such as curriculum and course design, learning environments, online community, sustainability and inclusiveness. Pedagogical aspects are considered throughout this study, making the design pedagogically informed.

The site of this study is a university of applied sciences (UAS) in Finland, where ODPs were a new type of education to diversify the programme offering in HE (Dill & Teixeira, 2000) and to offer new degree program education and services. The change from a campus-based degree education to an ODP can be significant for the HE organisation and its staff and students. In this study, approaches of service design are included as they can be used to create new services (Stickdorn et al., 2018) for specified groups (Joshi & Alavaikko, 2020) in a digital context (Reason et al., 2015). The empirical data in this DBR study is gathered from experts within the educational organisation, teachers and students of the ODPs, and ODP experts in a national working group. The experiences of the different stakeholders in the ODP context are analysed to compile the design principles for the holistic design framework.

During the research process, the term 'model' was used to describe the outcome of this study. However, the holistic approach to the design means that the outcome should be more than a model, a graphic form of a phenomenon (Cohen et al., 2007). Moreover, a framework can work as a design solution to a complex problem

in a specific context (Edelson, 2002) and guide the design to a wider form than e.g., a pedagogical model that would limit the design to pedagogy alone. Thus, the outcome of this study is referred to as the holistic design framework. In addition, a set of design principles were created to characterise the main elements of the holistic design framework to include organisational, pedagogical, and ODP perspectives when creating ODPs as a new type of education. The results may be of interest to educational organisations and their managers, administrators or educators who are interested to use the holistic approach to design ODPs as a new type of education to diversify their programme offering. Moreover, the results may be used to increase awareness of pedagogical, digital and organisational support needs of teachers and students when starting a new ODP.

1.1 The background of the study

This study is topical because of the impacts of globalisation, digitalisation and future visions on society, working life and higher education (Figure 1). The impacts of these external forces create expectations for the development of online degree education in Finland and globally, and place demands on the design framework under research in the present study. Due to the interconnection between the impacts caused by the societal changes and, on the other hand, the research needs of this study, both theoretical literature and national policy and strategy papers are used as the background.

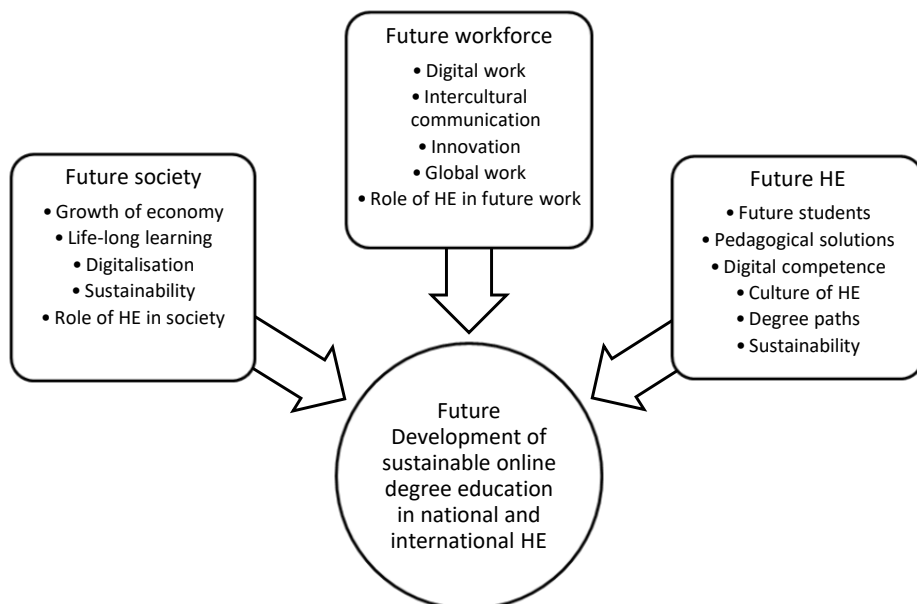


Figure 1. Interconnection between society, work and higher education of the future (Joshi, 2017)

Lifelong learning study opportunities are needed to support the sustainable educational goals of life-long learning and equal access to quality education (United Nations, 2015). The Sustainable Growth Programme for Finland outlines a plan for ecologically, socially and economically sustainable growth and aims to decrease greenhouse gas emissions, increase productivity, equality and the employment rate (Finnish Government, 2021c). The Sustainability Roadmap (Finnish Government, 2021b) presents measures to support the enhancement of competences and qualifications generated by the HE organisations to produce more graduates in the labour market, e.g., by creating new flexible and diverse forms of continuous learning and increasing the number of international students. The service promise and strategic goals for the education-based and work-based immigration include tripling the number of international students in Finnish HE and high-quality education offering (Finnish Government, 2021d).

Finland is one of the most digital countries in the world (European Commission, 2021). The Digital Economy and Society Index (DESI) ranking summarises the digital performance and progress in key digital areas, including digital inclusion and skills, digital infrastructure, the integration of digital technology and the digitalisation of public services (European Commission, 2021). Education is not one of the aspects measured in DESI, but with good infrastructure and wide access to digital services, Finland can be considered to have a suitable digital readiness to provide online degree education. Digitalisation is already an integral part of HE (Selwyn, 2013; Vaira, 2004; Rovai & Downey, 2010; Bourn, 2011).

There have been different visions for the digitalisation of education in Finland. In 2010, digitalisation was envisaged to support studying, promoting the skills of digital citizen and to be used in multiple ways (Liikenne- ja viestintäministeriö, 2010). The vision for 2020, on the other hand, was that digitalisation would be used in advanced ways in different environments, would be high-quality, current, and ecologically effective, and used by expert staff and motivated students (Ministry of Education and Culture, 2010). The vision for Research and Education 2030 set by the Ministry of Education and Culture (2017) in Finland is that digitalisation and different learning environments support learning, and flexible and personalised study paths and degrees are available to all.

Finland has a long-standing reputation as a provider of high-quality education especially in basic education, and typically ranks high in the PISA evaluations (OECD, 2018), but does not reach the same high position in the global HE rankings (Bothwell, 2021). Standards and Guidelines for Quality Assurance in the European Higher Education Area (2015) are followed in the design and implementation of HE in Finland. Traditional ways of educating may no longer work in a fast-changing education and society where the aim is to prepare students for global work (Deardorff et al., 2012; Konst & Scheinin, 2018). HE organisations must adapt to meet the new needs created by the digitalised society (Márquez-Ramos & Mourelle, 2018)

and respond to the sudden disruptions in the field of education (OECD, 2021a) by creating new open, flexible and technology-enhanced learning and teaching experiences (Naidu, 2019).

This study is placed in the vocationally-oriented universities of applied sciences (former polytechnics) in Finland that provide higher education where students can obtain Bachelor and Master level degrees in applied sciences (Ministry of Education and Culture, 2014). They aim to improve work life, encourage internationalisation and answer the learning and teaching needs created by the digitalisation in the constantly changing world (ARENE, 2018), and therefore the educational philosophy and practice should support the achievement of those goals in the praxis-oriented UASs (Tautila & Raji, 2012). The task of UASs differs from that of the science universities, whose mission is focused more on the academic research and scientific education, which makes the discussion on the future roles and mission of HE organisations interesting (Tautila & Raji, 2012).

Sustainable development (SD) has not received as much attention in discussions related to changing education as digitalisation and globalisation (Konst & Scheinin, 2020). HE organisations are considered to be leaders of transformation and therefore can take a leadership role in promoting SD (Leal Filho et al., 2020) to create graduates with the competence to improve sustainability (Wiek et al., 2011). All HE organisations in Finland have committed to sustainable development goals in educational activities (ARENE, 2020; UNIFI, 2020), creating a need for SD to be integrated in the design of all degree programmes in the future.

Working life in Finland in 2030 is visioned to be based on paradigms that utilise the cultural diversity of people and organisations, digital communication is the norm at work and 21st century skills are important to individuals and organisations (Alasoini et al., 2012). The concept of workplace is predicted to be extended to all environments where work can be done, where new generations require tailor-made work that allows for flexible approaches to changing life situations (Alasoini et al., 2012). HE organisations need to produce graduates for the society who have the necessary competences to work and sustain in a multicultural society of the future where interaction skills are still relevant (Sinisalo & Raudaskoski, 2017). As the studies are typically connected to work life and develop the study programme specific competences with the innovation competences during the learning process (Keinänen & Kairisto-Mertanen, 2019), it may be especially relevant for the UASs to consider the changing needs of the workplace.

Challenges may rise from local and global demands for work life (Dufva et al., 2017), and in Finland, globalisation has affected both working life and education by increasing multiculturalism through e.g. an increased number of foreign students, who may become members of working society, too (Crawford & Bethell, 2012) and whose stay in Finland after graduation is influenced by e.g., social factors

(Ministry of Education and Culture, 2021). Also the employability dimensions of completing an online degree as well as the student's perceptions of employability based on the study mode should be considered, as employers seem to have more negative views of online degrees, which in turn may increase inequalities in the employment of online degree graduates (Roberto & Johnson, 2019). With the growth of online education, employers are likely to hire more graduates who have completed their degree online and they may increasingly access online studies for professional development, thus employer views are important in developing new online programs (Linardopoulos, 2012). In the US, over half of students taking part in online studies live locally (Seaman et al., 2018), thus developing ODPs may be relevant for the local economy.

According to future work predictions, the pandemic is likely to deepen current inequalities in education, especially for those with lower education levels (World Economic Forum, 2020), adding to the urgency to plan for and deliver quality education in times of disruption (OECD, 2021a) and move from emergency remote teaching to well-designed online education (Hodges & Fowler, 2020). HE organisations face competition in the current market, and one possible way to meet students' expectations is to diversify the study programmes (Widiputera et al., 2017), which may infer considering students as customers and HE organisations as service providers (Paricio, 2017), thus changing the role of HE into more individualistic development of HE and society (Tautila, 2017). There is an increased value for services and customer expectations in a more digitalised environment, and service design offers a new approach to focus on delivering service and responding to the customer's needs in a digital context (Reason et al., 2015), as services are unique in that they create impact without a form of a product (Shostack, 1984). ODPs should bring extra benefits over traditional degree programmes to their stakeholders, including academic faculty as well as employers (Palvia et al., 2018).

Online and distance education are already considered to have become as commonplace in HE as campus-based education (Xiao, 2018) but few organisations yet have a strategy for offering online education (Obexer, 2018). Digitalisation is an integral part of globalizing education (Selwyn, 2013) and globalisation is part of HE (Vaira, 2004; Rovai & Downey, 2010; Bourn, 2011). Finnish HE organisations should include intercultural and international perspectives in program level (Crawford & Bethell, 2012) and some HE organisations have started to holistically integrate internationalisation into core activities instead of producing separate strategies (de Wit et al., 2015). In addition, all HE organisations in Finland have committed to the inclusion of sustainable development (SD) goals in degree education (ARENE, 2020; UNIFI, 2020), and technology can aid the integration of SD into educational activities (González-Salamanca et al., 2020).

HE programmes should be well designed and student-oriented (Ashwin, 2020). Future students' expectations are different (Márquez-Ramos & Mourelle, 2018) and new learning approaches are needed to support creating graduates as global citizens (Clifford & Montgomery, 2017). Online degree construction should be purposeful and focus on pedagogical aspects (Ragusa & Crampton, 2017). In the case of UASs, it is important to consider how the praxis-oriented approach of the UASs (Taatila and Raji, 2012) can be implemented in the online learning and teaching context, making the pedagogically informed focus of the present study relevant for the UASs.

In Finland, HE organisations are funded according to indicators in the performance-based funding model (Ministry of Education and Culture, n.d.), which has caused HE organisations to develop their education according to the funding indicators and focus on efficiency, whilst having a negatively experienced impact on the quality of teaching content and learning guidance (Nenonen, 2020). By examining the needs of the various target groups, balance can be found in developing the quality of content and implementation of the education (Nenonen, 2020). As HE organisations are expected to produce more graduates in the labour market (Finnish Government, 2021b) and online mode of degree education is likely to increase in the future (OECD, 2021), it is important to consider how ODPs can respond to the needs set in the funding model without negatively impacting the quality.

In Finland, year-round digital studies for all UAS students are offered on a joint national platform CampusOnline (CampusOnline, n.d.) Currently, all 38 HE organisations in Finland participate in a national initiative DigiVision 2030 to give learners more flexible learning opportunities, to strengthen the teachers' role as facilitator of high-quality study experiences, and to increase the standard of Finnish HE and access to employment. The national implementation program aims to make Finland a model country for flexible learning, and a global pioneer in higher education. The operational target state includes each learner having one identity in a national joint authentication service, using the open e-learning offering of all HE organisations, and having access to their national "my data" portal with all personal learning and competence. (Digivision2030, 2021).

Digital skills are essential for everyone in the future (European Commission, 2020). Training in digital skills is essential for teaching staff to provide inclusive high-quality education with the support of digital technology (European Commission, 2020), but teachers need to be supported in the integration of technology into teaching (Guilbaud et al., 2020). Teachers are possibly required to assume a new role and competences in the use of technology, pedagogy and design (Cober, 2015; Kellen & Kumar, 2021) when entering an ODP as a new teacher, which may have an impact on their professional identity (Murtonen & Vilppu, 2020) that takes place slowly in educational change (Vähäsantanen, 2015). The role of management

is important in leading the change and supporting their staff in the change process to deliver new type of education (Keinänen & Kairisto-Mertanen, 2019). Also, the pandemic has caused differences in the levels of digital competence, implementation and learning outcomes (European Commission, 2020) as the focus has been placed on digital platforms instead of pedagogy in online teaching (Adedoyin & Soykan, 2020).

Future visions for ODPs in Finland show a variety of possible futures, ranging from fully flexible to more structured, centrally supported degrees (Joshi et al., 2022a; 2022b). In the future, access to open education and micro degrees can offer possibilities to update one's competences (Dufva et al., 2017). In the present study, these competences are extended to include sustainability competences, since the task of the UAS's is to educate experts who have basic competence in sustainable development so that they can further promote these competences in their work for sustainable change and expertise (Arene, 2020).

1.2 The process of the study

The study follows a DBR process (Design-based Research Collective, 2003) which comprised four sub-studies in total, each of which included one cycle (Figure 2). The topic of this study is investigated in the context of one Finnish UAS (sub-studies I-III) and in the context of the national cross-studies provided online by the Finnish UASs (sub-study IV). The overall aim of the study is to create a design framework and accompanying design principles for the pedagogically informed holistic design of ODPs in HE.

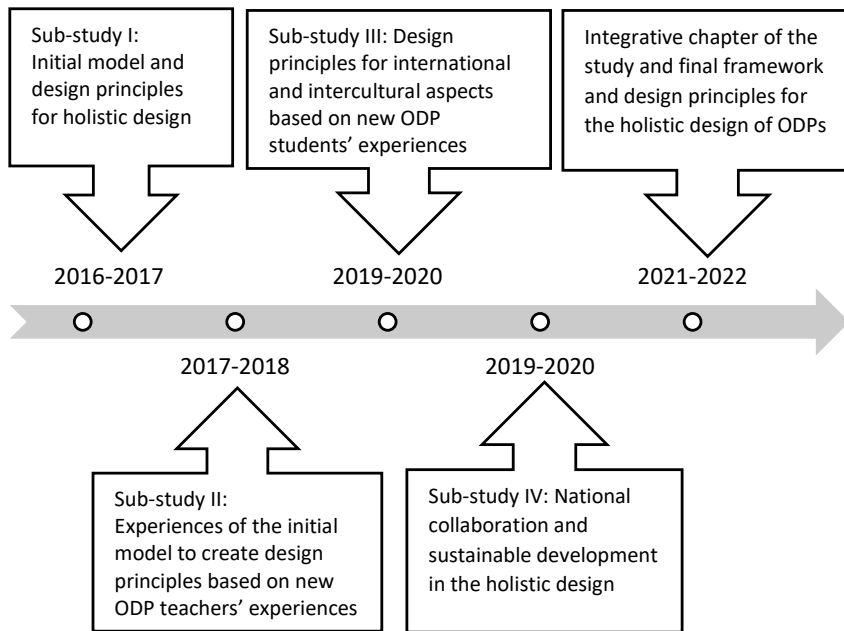


Figure 2. Timeline of the research process

The data collected in the study represents a wide range of viewpoints to create the design framework and accompanying design principles for the holistic design. The research was initiated in 2016 when the organisation made a strategic decision to start offering ODPs as a new type of education. Therefore, the study focused on the context of an organisation that did not have previous experience of offering ODPs.

The collection of data in *Sub-study I* took place during autumn 2016 - spring 2017 and consisted of a literature search of ODP design elements, expert interviews within the organisation and placing the pedagogical strategy of the organisation in the framework of a digitally competent educational organisation. Sub-study I resulted in the initial model for the pedagogically informed holistic design of ODPs in HE. The model was created before the launch of the first ODPs, and, therefore, approached the design as a theoretical proposal rather than testing it in practice. This conforms to principles of DBR, where the aim is not only to develop practical solutions in the local context but to refine theoretical information (Ryu, 2020; Design-based Research Collective, 2003)

The aim of *Sub-study II* was firstly to gain information about how teachers as new ODP teachers experienced the model, and secondly, to involve them in the design of the ODPs as implementers of the pedagogical approach. Also, teachers' support needs were an important viewpoint in this sub-study. The DBR Cycle 2 took place

in autumn 2017 with the focus on the experiences of the teachers in the first three ODPs. The data was collected from two thematic focus group interviews at the beginning of the implementation of the ODPs. The results were analysed during 2018 to create design principles based on the teachers' experiences.

Sub-study III focused on students as the users of the ODP as a new type of education and placed the study in the multicultural virtual context of an international ODP. The sub-study comprised two parts, an electronic survey in spring 2019 and a thematic semi-structured interview in spring 2020. The data was collected from students of an international ODP in the HE organisation, and the students represented a diverse group in terms of the year group, linguistic and cultural background as well as online study experience. This sub-study used mixed methods with a quantitative and qualitative analysis. The results of the third sub-study were presented as design principles for designing international ODPs in Finnish HE.

At the end of 2018, the author began coordinating a national online degree working group as part of a national ministry-funded project eAMK (eAMK, n.d.). This allowed for *Sub-study IV* to start in 2019 with the aim given to investigate how the model could be used in the design of ODPs completed as national cross-studies. This coincided with the national work for sustainable development work that was ongoing in all HE organisations in Finland (ARENE, 2020; UNIFI, 2020) to create common objectives for SD goals, thus creating an additional need for the ODP design. The fourth cycle took place in three phases and the data was collected from the online degree working group experts of the eAMK project. The first phase was an electronic survey in 2019 to prioritise the principles of the model. The second phase took place in early 2020 as a visualisation to identify important elements for the design. The third phase was a thematic focus group interview to find out how SD can be included in the design. The results of the fourth sub-study were recommendations for SD in the design of ODPs completed as national cross-studies and in national collaboration. The writing process of the final dissertation began in 2021.

1.3 The outline and aims of the study

The present study focuses on the pedagogically informed holistic design of ODPs as a new type of education in the HE organisation. It contributes to previous knowledge on online learning and the design of ODPs by adopting a new approach in integrating an organisation's pedagogical strategy and digital competence to ODP design principles and service design levels. Moreover, it creates new knowledge on the integration of sustainability and inclusivity in the ODP design. The study contributes to research on the development of Finnish HE by exploring the development of ODP education from the perspectives of HE organisation and

national collaboration. In addition, it adds to previous research on how to support teachers and students in the new context of the ODPs.

The main aim of this study is to create a pedagogically informed framework and accompanying design principles for the holistic design of ODPs in HE that integrate the digital competence of the HE organisation and its pedagogical strategy as well as the specific requirements of ODP studies and services online to create meaningful learning experiences in HE. DBR process aims to produce a model that is applicable to a wider audience, is iterative and offers new educational knowledge (Juuti & Lavonen, 2006). Moreover, it attempts to bridge the gap between theory and practice (Alghamdi & Li, 2013) in educational design research (Goodyear, 2005) by having the author take part as an active participant in the research process to develop pedagogical processes in the local context (Collins et al., 2004).

The study combines the results of four DBR cycles to create the final framework for the pedagogically informed holistic design of ODPs in HE, including levels of service design to answer the need to create ODPs as a new type of education. The specific aims of the study are:

1. To create a holistic design framework and accompanying design principles for the pedagogically informed design of ODPs in HE
2. To create new knowledge to previous research on ODP design by combining the perspectives of educational organisation, digital competence, pedagogy, and service design.
3. To contribute to educational design and online learning research through the design of a new type of education where services are supported by digital competence and pedagogical strategy for ensuring meaningful learning experiences.
4. To expand understanding on how to design sustainable and inclusive ODP education in local, national and international online contexts to support teachers and students participating in the new type of education.

The following Chapter 2 presents the key concepts and theories of the study. This is followed by the research questions in Chapter 3 and research design in Chapter 4. Chapter 5 is a summary of the main results of each sub-study, and Chapter 6 presents the holistic design framework with accompanying design principles as the main result of this study. Finally, in Chapter 7 the framework and the results are discussed, the methodologies and ethical aspects of the study are evaluated, and implications for HE and practitioners as well as suggestions for future research are presented.

2 Key Concepts and Theories

This research is connected to the wider HE research by making references to its three major thematic areas: 1) teaching, learning, curricula and competences; 2) governance and management; and 3) the HE system and societal context (Teichler, 2015). Differences exist in HE research (Teichler, 2015). The present study is contextualised in the Finnish HE research (Välimaa, 2012) and HE pedagogy research of the UASs (Friman & Kantola, 2022). At the time of starting this study, ODPs were not that common in the Finnish HE (Joshi, 2022a) and there was no previous literature available on designing ODPs in the Finnish HE (Joshi, 2017). Due to this, the literature relies on international research on the development of online and distance learning and the design of online programs in HE.

The theories used in this study address the research question by providing information about the holistic design of ODPs as a new type of education in the context of a digitally competent HE organisation with a focus on pedagogy. The concept of ODPs in HE is defined through previous literature regarding ODP design models and case studies situated in online learning. Holistic design is approached from the viewpoint of an educational organisation where the design of ODPs is connected with the general requirements for degree education in the digital context of ODPs. The design is pedagogically informed by the pedagogical strategy of the HE organisation, but also by previous literature on the new ODP teachers' role and support needs as designers and practitioners of pedagogy, situated in online learning and HE pedagogy. This is complemented with theoretical information about service design to inform the design about how to create ODPs as a new type of education where all services are required to be online. According to the principles of DBR, the theoretical information is combined with the empirical data from sub-studies I-IV to form the final framework.

In the following section, the key concepts and theories are presented in more detail.

2.1 Online degree programmes in higher education

Online learning in HE has gone through paradigm shifts that have changed our way of thinking in terms of the definition, design and delivery of education (Harasim, 2000), moving from the early web-based education (Casey, 1998) where the learning relied more on electronic materials and the sharing of information, to more

interactive e-learning (Ghaoui & Janvier, 2004) and making use of collaborative learning theory for online learning (Harasim, 2012). The first totally online courses started in 1981 with non-credit "mini-courses" and executive training programs (Harasim, 2000). Distance education has directed online learning development, and theories provided by distance education can be utilised to design flexible, autonomous and structured programmes in a supportive community (Saba, 2016).

Online programmes have been provided since the later 80's (Harasim, 2000) especially in the field of distance education (Peters, 2001; Paolucci & Gambescia, 2007). Examples can also be found in the development of virtual universities (d'Antoni, 2006) or virtual campuses where pedagogical approach and support is seen as vital for the student's learning experience (Stansfeld et al., 2009). Some of the trends in the strategic planning of online education have reflected the direction towards competency-based and self-directed education, blurring the distinction between local and distance students, and requiring professional training courses and increased resources (Howell et al., 2003). The design of globally recognised online programmes should focus on creating content, assessment and delivery that supports the achievement of skills to create quality (Combe, 2005). The research on administrative models (Paolucci & Gambescia, 2007) is complemented by the cost-effectiveness of the online degree provision (Chipere, 2017), which seems to compete with that of quality (Rovai & Downey, 2010; Shelton, 2011). Quality criteria is suggested to be defined in the context of a specific degree programme (Benson, 2003).

Technology in education demands cultural and pedagogical changes, as well as adjustments in the HE organisation's operations, philosophies and structures (Desai et al., 2008). New affordances allow the use of distinct aspects of the learning process where distance educators and students should be skilled and informed to choose the right mix of pedagogy and technology (Anderson & Dron, 2011). Some of the changes in teaching and learning through technology in distance education have been the shift from institutional-based to home-based, fixed to personal curricula, knowledge transmission to learning facilitation and classroom study to learning packages (Desai et al., 2008). In terms of ODPs as they have been defined in the context of this study, learning includes both synchronous and asynchronous independent and collaborative guided online study that may take place on commonly agreed on platforms and during agreed on sessions (Joshi et al., 2022a), reflecting the realisation of the learning shift anticipated by Desai (2008).

Cunningham et al. (2002) suggest that technological changes put pressure on management thinking to succeed in the move from traditional to technology-driven business. The use of technology means a shift in not only the organisational culture but also in terms of designing learning and teaching (Laurillard, 2012), since educational technology with pedagogical practices can "support performance, engagement, creativity, inquiry and knowledge building" (Behnagh & Yasrebi, 2020,

1907). For the HE organisation, it also means that the digital infrastructure has to be reviewed, as the strategic planning of online programs also includes defining the vision, mission and objectives coupled with available resources, technologies and financial needs (Moore & Kearsley, 2005). Rovai & Downey (2010) suggest that strategic planning can be used to create quality online programmes. The strategic planning in this study refers to creating strategies for ODPs, including a strategy for offering online education (Obexer, 2018), integrating the pedagogical strategy of the organisation (Konst & Kairisto-Mertanen, 2020) and digital competence (Kampylis et al., 2015).

The design of online learning can have positive effects, such as an increase in the study commitment and exam performance of online degree students' (Scarabottolo, 2019) but may suffer from non-completion of studies especially in higher education where many adult students may not be seeking a diploma and, thus, do not complete their online studies (Delnoij et al., 2020). Several case studies describe the design and implementation of ODPs in different study fields, such as IT (e.g., Koohang et al., 2010), undergraduate online degrees (e.g., Newlin & Wang, 2002; Snell & Penn, 2005) and online doctoral programmes (e.g., Combe, 2005). Examples can also be found of transferring degree education from face-to-face to online (Baker & Watson, 2014) where differentiation between online and face-to-face degrees has been made to meet the expectations of online degree students (Ragusa & Crampton, 2017). Online studies can make education more accessible, as online and on-site studies seem to attract different types of applicants (Goodman et al., 2017). Some universities do not differentiate between online and on-site studies to maintain the same quality between both modes of study, and to ensure the reputation of the school (Goodman et al., 2017), which may affect how employers perceive online degrees (Linardopoulos, 2012). Online degrees may not be acceptable for gaining employment for new graduates (Adams & de Fleur, 2006; Roberto & Johnson, 2018).

Globalisation has influenced the provision of ODPs where students are offered international study opportunities in their own local context through online studies (Obexer, 2018; Chipere, 2017), although merely studying online does not mean that the design has been culturally aware (Cohen & Soffer, 2015). There may be variance amongst national cultures in the acceptance of using technology in education (Nistor et al., 2013), and therefore pedagogical aspects are important in designing globally networked learning environments that expand beyond traditional degree programmes (Starke-Meyerring, 2010).

In Finland, online learning is a part of HE curricula (Murtonen et al., 2020) but Bachelor level degree programmes offered fully online were not that common at the time of starting this research in 2016 (Joshi, 2017). To gain an overview of the ODP offering in Finnish higher education, the author conducted a search during the autumn of 2016 to investigate the number of ODPs offered on a website (Studyinfo.

fi) that lists study programmes leading to a degree through the general application system in Finland. The term ‘Verkkotutkinto’ (online degree) resulted in eight Bachelor level ODPs, out of which one was in English, and all eight were offered by UASs. (Joshi, 2022a; Joshi, 2017). In April 2018, the search with the same search term resulted in two new ODPs, both offered in Finnish. The website was renewed in 2021 and using the current search filters, a search with the filters ‘Education type’ and ‘Online teaching’ resulted in 1741 study programmes in 37 educational institutions (both science universities and UASs) where online teaching is a part of the degree. Although this result may not reveal the exact number of actual ODPs, it may reflect the results of the COVID-19 pandemic, where online studies have become an integral part of the HE mode. It may also reflect the still existing mixed use of terminology related to online learning (Moore et al., 2011; Johnston, 2020; Joshi et al., 2022a), as a closer inspection of the results shows a combination of study modes within the programmes, possibly referring to ‘blended’ degree education.

Indeed, ODPs may be understood in many different ways, for example the definition ‘blended programme’ refers to a degree where up to 30% is offered face-to-face with the rest online (Sener, 2015), whereas an online degree is such where a student is required to complete all study credits completely online and the educational organisation offers all the support services, including student office services, library services and so on, fully online (Sener, 2002; 2015). Blended education combines face-to-face training to online learning using various methods, technologies and models (Bonk & Graham, 2006). This study does not examine the ODPs in the context of blended learning, although some HE organisations in Finland refer to ODPs also in the case of blended education (Joshi et al., 2022a), depending on the share of online and onsite studies as part of the degree.

The confusing terminology was evident in the context of Finnish HE where the terms ‘online degree’ (verkkotutkinto) and ‘blended degree’ (monimuototutkinto) were used interchangeably, as found by the online degree working group that was set up in the national ministry-funded project eAMK to investigate the possibility of using the cross-studies and digital platform CampusOnline to create joint online degrees (Joshi et al., 2022a). The group studied the use of the terms ‘online degree’ and ‘blended degree’ and determined that the terms were not used consistently or in a standardised manner, and, therefore, did not sufficiently inform the possible applicant of the kind of study mode that the degree would comprise. The group conducted an analysis of the terms, which resulted in a joint definition and recommendations on the nation-wide use of the term ‘online degree’ (Joshi et al., 2022a). To add to the problem of terminology, in the initial phase of the present study, the ODPs were referred to as ‘virtual degrees’ in the local context of the HE organisation, reflecting yet another interchangeable term.

In this study, the term online degree programme (ODP) refers to a Bachelor level degree programme that is completed online, includes interactive elements and

synchronous online meetings, and is guided by teachers (Joshi et al., 2022a). This is combined with the organisational context in Sener's (2002; 2015) definition, concluding that an ODP is a HE degree where a student is required to complete all study credits completely online and all support services are offered fully online by the educational organisation as well. Therefore, an ODP in this study is a Bachelor level degree where all degree studies are completed online, all support services are offered online and the online study includes interactive, guided and synchronous elements. This definition may be applied to Master or Doctoral level ODPs, too.

2.2 Holistic design in a digitally competent higher education organisation

The term 'holism' was first coined by Smuts (1926), who used it to describe "fundamental factor operative towards the creation of wholes in the universe". Collins Dictionary (2022) defines the term holistic as 'dealing with or treating the whole of something or someone and not just a part'. Dewey's (1916) holistic approach to experience implies that everything is an interaction between human and its environment. Although modern experience may differ from that of Dewey's (1916), including virtual and mediated experiences utilised in new types of holistic initiatives in education, the importance still exists (Nielsen, 2008). The term 'holistic education' can be used to describe an approach where the person is educated as a whole, in cooperation between persons and through experience to reach full potential (Miller, 1990). Kolb's (2015) experiential learning theory approaches learning as a holistic process that can be applied in all situations in life. This study does not concern the holistic approach to education or learning as such, instead, it examines the holistic design of educational programmes to create meaningful learning experiences.

The holistic analysis of online education provision can include global, country, institutional, curriculum/program, and micro-level factors (Palvia et al., 2018). In this study, the concept by Kek and Huijser (2017) is adopted, where holistic design refers to a design approach that is applied throughout the organisation, making it a 'whole-of-institution' approach. In a successful ODP design, an investment in the ecosystem of infrastructure, online community, instruction and support, to name a few, is needed (Hodges et al., 2020). It is especially important for those HE organisations that have a pedagogical strategy to follow a holistic approach, because through the holistic approach it is possible to apply the shared design and practices (Paniagua & Istance, 2018) to achieve the benefits of the pedagogical strategy (Harper & Vered, 2017) and integration of technology (Tondeur, 2018). The holistic approach assumed here means that changes are taken forward at the level of the entire organisation, and disciplinary differences are not considered, although

they are relevant for instructional and learning design (Carraher Wolverton & Guidry Hollier, 2019).

An important aspect of the holistic approach is the inclusion of various stakeholders and co-design (Kek & Huijser, 2017). From the point of view of the HE organisation, collaboration with internal partners is important to ensure standardised implementation of technical and pedagogical solutions (Swan et al., 2014), and it is important to involve the academic staff in the change (Honkimäki et al., 2022). In terms of ODP design, the focus of online education research has been more on teaching and learning of online courses (Kumar, 2014). It is important to identify the type of degree that fits the context and the students (Waugh & Su, 2015) as localisation, cultural adjustment and choice of technology is needed for a suitable online education delivery mode (Palvin et al., 2018). Pedagogical design can be considered to describe a wider concept than instructional design (Häkkinen & Hämäläinen, 2011).

Holistic approaches are also lacking in SD activities in HE (Findler et al., 2019), and education for SD should be integrated in the organisation's SD efforts (Leal Filho et al., 2020). Holistic view can be expanded to examine how HE organisations interact with the surrounding environment and society (Findler et al., 2019). Similarly, internationalisation should be considered holistically in terms of staff training, instructional design, student support (Rasi et al., 2014) and diversity of staff and students throughout the programme (Hudzik & McCarthy, 2012; Clifford & Montgomery, 2017) and the educational organisation (Qiang, 2003). HE should provide inclusive education that is designed for all backgrounds and abilities (Artiles et al., 2006). The ODP can also be integrated with the ecosystem of the educational organisation and student (Suhonen & Sutinen, 2014), and its surrounding organisational, epistemic and political practices (Hermansen, 2020).

In the context of the HE organisation of the study, there was no strategy for digitalisation, and therefore it was important to consider the digital competence of the organisation to provide degree education and support services online for the first time. It is important for the HE organisation to evaluate the available resources, technologies and financial needs (Moore & Kearsley, 2005) within their digital infrastructure to ensure they correspond to the needs of the ODPs. The digital competence of a HE organisation determines the ability to offer the educational services in a digital context. DigCompOrg (Kampylis et al., 2015) was selected as a theoretical framework for the organisational design process, because can be used for a process of planning for change on three dimensions: pedagogical, technological and organisational (European Commission, 2018a) and employs a holistic approach that is suitable for the purposes of designing ODPs. Moreover, it offers a conceptual framework for any educational organisation that wishes to implement digital solutions in their activities and can be used as a strategic tool for policy makers (Kampylis et al., 2015), making it a suitable framework for designing ODPs.

DigCompOrg was originally developed by the Joint Research Centre (JCR) of the European Commission and is based on an extensive study of frameworks and literature (Kampylis et al. 2015). DigCompOrg builds on the DigComp for Citizens (Ferrari, 2013), which comprises five dimensions and was based on the detailed study of several frameworks (Ferrari, 2012) and the mapping out of key competences (Ala-Mutka, 2011). New applications and adaptations to local goals are welcomed in the use of DigComp and by citing the source it can be used, reused and modified (Klutzer & Pujol Priego, 2018). DigCompOrg focuses on teaching, learning, assessment and related learning support activities (ibid.). Digitally competent organisations aim to transform education in order to ensure the gaining of knowledge, skills and competences needed by the future workforce in Europe, according to the Europe 2020 strategy (ibid.), and it can be used a strategic tool and for systemic approach for using digital learning technologies in educational organisations (EU Science Hub 2019).

The DigCompOrg framework comprises the following seven thematic elements: Leadership & Governance Practices; Teaching & Learning Practices; Professional Development; Assessment Practices; Content & Curricula; Collaboration & Networking; and Infrastructure. In addition, there is an optional sector specific element, as well as 15 sub-elements (Kampylis et al., 2015). Worth noting in the use of DigCompOrg is the interrelation between individual and organisational responsibilities, highlighting the fact that a digitally competent organisation needs both governance and stakeholders working together (European Commission, 2018a). The framework has been utilised in research related to digitally competent educational organisations especially in basic education, such as investigating its application in a framework for a digitally mature school (Ređep et al., 2017), analysing teacher expectations of digital competence in schools (Mannila, 2018), or preparing for different roles within a digitally competent educational organisation (Malach & Kostoloányová, 2017). Petterson (2018) used DigComp in analysing organisation of schools for digitalisation. Through the process of self-reflection, the framework supports the integration of digital technologies into teaching, learning and organisational practices in the local HE organisation. As the framework requires one to provide a certain level of quality in all of the services and elements of the framework, it also enables a quality viewpoint in the development process of the pedagogical design of an online degree programme. There is a lack of previous research available on the use of DigCompOrg in the context of HE, and this study adds a dimension of ODP design in HE to the existing literature.

As a conclusion, in this study, the term 'holistic' is used to refer to an approach where ODP design includes all educational and support services in the digital context, such as strategic decisions of the HE organisation, infrastructure, curriculum and course design, learning environments, student support, teacher training, online community and marketing.

2.3 Pedagogically informed design of online degree programmes

The digitalisation of society has created the need to redesign learning (Kalantzis & Cope, 2005). Online programmes can be designed by using theories of distance education (Saba, 2016). Distance learner interactions can be divided into interaction with the content, the instructor, the other learners and the technology (Desai et al., 2008). The term ‘engagement’ can be used instead of interaction and expand the concept of technology to the learning environment, also adding interactions with assessment activities, feedback and institution (Naidu & Roberts, 2018). When more flexibility is added into teaching and learning transaction, the learner’s experience can be more personalised (Naidu & Roberts, 2018). Students’ involvement in learning should also be considered as part of informed design (Ruokamo et al., 2012).

When choosing the technology used for learning, it should support the pedagogical choices in order to be purposeful (Jefferies et al., 2007) and when using educational technology in multicultural settings, one must take into account cultural dimensions (Downey et al., 2005; Srite et al., 2008; Nistor et al., 2013). In addition to diverse digital environments, it is important to consider the pedagogical choices to create deep learning (Ruhalahti, 2019). There is also a risk of using learning management systems and online learning platforms as tools for organisational management rather than supporting learning or engaging students (Hildebrandt, 2019).

In designing online degree education, it is not sufficient to only look at the online aspect of the education, but also the pedagogy within that online context, as pedagogy is one of the critical factors in creating successful online programs (Rovai & Downey, 2010). HE organisations should consider pedagogy in the creation of new online degrees (Ragusa & Crampton, 2017). It is important for HE organisations to communicate their behavioural patterns and show that they belong to the wider society (Bodhi et al., 2021). It is especially important to design online programs carefully, as online students can feel disconnected from the educational institution and their peers (Kumar, 2014).

Research is available for applying learning theories in an online degree context (Kessler & Haggerty, 2010), theory-based design of meaningful e-learning (Dabbagh, 2005; Ruokamo et al., 2012), using design principles for applied learning environments online (Downing, 2017) or designing from a pedagogical point of view (Hochberg, 2006). Other frameworks for higher education pedagogy online include designing collaborative learning (Green et al., 2010) and student-centredness in learning design (Holdsworth, 2016). Pedagogical frameworks that have been created for the design of new online programmes can also help in the design, implementation and delivery (Eteokleous & Neophytou, 2019). Some pedagogical approaches may be more suitable to support the development of specific SD competences, such as future orientation or critical thinking (Lozano et

al., 2017). It is important to involve both students and staff in the development of the SD competences (Brundiers et al., 2020). Inquiry-based learning can be used for developing SD in education (Rohweder et al., 2008).

The pedagogical approaches for online degrees require development (Green et al., 2010; Jääskelä & Nissilä, 2015), as new pedagogical solutions can support students in preparing for the changing work life (Tynjälä & Gijbels, 2012). When the first online courses began, teachers struggled to teach fully online, and students struggled to study fully online, as neither had any experience (Harasim, 2000). Starting to teach in an ODP can be a new experience and thus support is important (Lockhart & Lacy, 2002). Therefore, research is needed about the barriers that teachers who are new to online teaching face in different geographical and cultural environments (Kellen & Kumar, 2021), and teachers need support in implementing new approaches (Chie et al., 2018).

Teachers may also find their new role as ODP teachers different from their old role in terms of teaching fully online or teaching multicultural virtual groups for the first time, which may influence their identity (Warren, 2018). Online degree teachers may have different roles in online teaching (Martin et al., 2021) and as central motors of pedagogy can ensure that degree studies can be implemented as intended to be experienced by students. Teachers' views can inform the design of a degree (Badia et al., 2019) and they need competences in design and research (Kirschner, 2015). Pedagogical skills for teaching online are important (Bennett & Marsh, 2002; Salmon, 2011; Harasim, 2012). When teaching online, one must possess the skills and competences to teach online but also to design inclusive education for various cultures, perspectives and abilities (Artiles et al., 2006) and teachers need training in that (Moriña, 2017) although teacher training alone is not enough (Walton & Rusznyak, 2017).

Technology-enhanced education can create more possibilities for flexibility than conventional teaching but is dependent on the organisation's infrastructure to provide the level of flexibility, amongst other variables (Naidu & Roberts, 2018). A pedagogical strategy influences all operations of the HE organisation, including learning and teaching, working life cooperation and curriculum design (Konst & Kairisto-Mertanen, 2020). Thus, a pedagogical strategy in this study differs from some other definitions of pedagogical strategy, such as that of Goodyear's (2005), who defines pedagogical strategy as something to do with action that is taken to achieve certain objectives. Goodyear (2005) uses the term 'high level pedagogy' to describe the use of philosophical positions in specific educational settings, which might be considered a similar concept to the pedagogical strategy of the HE organisation discussed in this study.

In the HE organisation that is the site of this study, the pedagogical strategy is called innovation pedagogy (Kettunen et al., 2013). It should be noted that this study does not concern the use of innovation pedagogy as such, instead it focuses

on the integration of the pedagogical strategy into the holistic design. Innovation pedagogy is also not a pedagogical model nor a learning theory, instead it is often placed in between the two. Innovation pedagogy arises from humanism, cognitivism, sociocultural approaches, and collaborative learning (Penttilä et al., 2013). As such, it is a pedagogical whole-of-institution wide approach which defines the construction of knowledge for the creation of innovation for the needs of working life developed at Turku University of Applied Sciences (Konst & Kairisto-Mertanen, 2020). Different pedagogical models (Joyce & Weil, 1980), such as project-based learning or problem-based learning, can be used to implement the aims of innovation pedagogy in the teaching situations and environments through different methods i.e., instructional strategies, such as simulation, collaboration or reading circle and tools, such as blogs, learning labs and so on.

Since the HE organisation had not offered ODPs before, there was a need to integrate the pedagogical strategy in the design of the ODPs. Innovation pedagogy has been implemented at the HE organisation in all its traditional campus-based degree programmes since its introduction in 2011, and is applied in online and blended courses, but had not been applied holistically or systematically in the design of an ODP prior to this study. The use of innovation pedagogy has been verified by the Finnish Education Evaluation Centre in their latest audit conducted in the organisation in 2022 (Konkola et al., 2022), where they conclude that based on the evidence collected during the audit, innovation pedagogy shows in the design of curricula and degree programmes, as well as in the accompanying guidance and instructions. Also, innovation pedagogy links education to working life and RDI activities of the organisation. This further confirms the findings of a thematic internal self-assessment of the pedagogical strategy conducted in the organisation in 2021, which resulted in similar findings across all study fields, but also identified development needs in how students identify their competences, how implementation plans are created to provide equal study experiences and how RDI, sustainable development and internationalisation are integrated.

According to innovation pedagogy, there always exists “an interactive dialogue between educational organisation, students, and surrounding working life and society” (Kettunen et al., 2013, 337), creating the need for integration of innovation pedagogy also in the ODP context. Innovation pedagogy focuses on those teaching and learning methods that enable the learner to collaborate and construct knowledge through social interaction and dialogue (Penttilä et al., 2013) to produce learning outcomes and develop innovation competences (Kettunen et al., 2013) that are created and supported in individual, interpersonal and networking contexts. Students develop innovation competences, and through the innovation processes, they develop their problem-solving skills, team working abilities and systems thinking through self-assessment (Keinänen et al. 2018), also supporting the future work life skills (World Economic Forum, 2020). Some of the methods recommended are

problem-based, task-based and dialogue-based learning. Teachers need training and support in utilising these new methods and approaches to teaching and learning (Konst & Scheinin, 2018).

Innovation pedagogy consists of cornerstones and elements that should be integrated into any teaching and learning activity (Konst & Kairisto-Mertanen, 2020). These are RDI integration with studies; Flexible curricula; Multidisciplinarity; Activating learning and teaching methods; Versatile and development-oriented assessment; Renewing teacher and student roles; Working life orientation and co-operation; Entrepreneurship; Globalisation; and Systemic thinking. These as well as the overall aim of innovation in learning processes are developed to support participation in innovation processes and through that eventually a better life in a sustainable future, coupled with the student's growth as a human being and developing the values and ethics as well as comprehension of humans and surrounding nature (Konst & Scheinin, 2018). This study contributes to previous research on innovation pedagogy by integrating it into the ODP design, thus examining the use of innovation pedagogy in the context of an ODP for the first time.

2.4 Designing online degree programmes as a new type of education

There is a change of paradigm in HE where students are increasingly considered to be customers largely due to increased competition (Paricio, 2017; Taatila, 2017). There is an increased value for services and customer expectations in a more digitalised environment, and the term design has become an essential part of online learning with its concentration on how online learning is used, applied, and tested (Beetham & Sharpe, 2007). In Europe, this is showing in the new HE paradigm where education is changing from free or partially supported to competitive student-customer markets where costs are not seen as a national investment anymore (Taatila, 2017). Cost-effectiveness (e.g. Chipere, 2017) in the design may serve the expectation of approaching students as paying customers. It is important for HE organisations to evaluate the target market of their ODPs and the perceptions of the students to better meet their needs as students and as customers (Ragusa & Crampton, 2017). Quality is a critical factor in determining student satisfaction (Kanji & Tambi, 1999), and the quality of the online programme may aid completion of studies (Yang et al., 2017). Quality in ODPs can be created through many factors (Rovai & Downey, 2010).

In Finland, HE organisations are funded according to a performance-based funding model, where the most important funding indicator is the number of completed Bachelor's degrees, accounting to over half of the core funding (Ministry

of Education and Culture, n.d.). The funding model includes many other indicators, one of them being student feedback. Previous ODP research states that satisfaction with course, programme and learning outcomes positively affect the students' persistence in completing their online programme (Yang et al., 2017), making it important to consider creating meaningful learning experiences for students that translate into completed degrees, to positively impact the performance-based funding model. There is some criticism that the funding model directs the HE organisations to be more effective at the cost of quality of teaching and learning practices (Nenonen, 2020), thus placing more importance on focusing on quality in the design.

The holistic design approach adopted in this study is also an important feature of service design, which is used to some extent in HE pedagogy (Joshi & Alavaikko, 2020). Research is needed in how to create and manage co-creative design processes in organisational and national settings (Joshi and Alavaikko, 2020). Student views (Brooman et al., 2015) and teacher views (Baran et al., 2011; Laurillard, 2012) are relevant in the learning design and development processes, also in the international contexts (Palloff & Pratt, 2003). Teachers as designers have a critical role in the design of learning with technology, as they need to oversee the technology and lead educational innovation by focusing on clear principles for designing good teaching and learning (Laurillard, 2012). Teacher satisfaction and emotions may be transferred to the teaching they offer, thus influencing student satisfaction (Reunanen & Taatila, 2021). Students' learning outcomes should be considered in the technology-enhanced learning design (Bower & Vlachopoulos, 2018). In this study, the focus is on the student not as a customer, but as the end-user, an active participant and member of a community, in the new type of education that demands new thinking and a design approach from the HE organisation providing the education and support services in a digital context.

User-focused approach of service design can be used to support the DBR research process (Keskitalo & Vuojärvi, 2018). This opens a new possibility to add service design in the design of an ODP, and this study can therefore contribute to the service design research in the context of ODP design in HE. In line with the holistic approach, service is experienced by anyone using the service (Stickdorn et al., 2018). As part of service design, the role of the organisation is essential in enabling various actors to take part in the service exchange (Vargo & Lusch, 2016) and the stakeholder views are relevant in the design process, similar to the development of online initiatives that require the expertise of many actors (Durdu et al., 2009). Service design focuses on human perspectives and therefore suits intangible objects (Moritz, 2005), such as online education, teaching and learning. Indeed, human participation and empowerment adds value to services (Rytilahti & Miettinen, 2016). Service design focuses on delivering service and meeting the customer's needs in a digital context (Reason et al., 2015). In addition, it offers an approach for new

organisational challenges and strategic initiatives (Reason et al., 2015), which in this case is the setting up of a new initiative of ODPs in HE, as strategic design can also be used to create competitive advantage (Stevens, 2010). In this study, creating new ODPs is considered to be a new type of educational service offered to a specific group of students.

The following chapter presents the research design and questions of this study, followed by a description of design-based research as the research strategy of this study.

3 The Research Questions

The aim of this study is to address the research needs in the holistic design of ODPs in HE by answering the main research question “*What kind of model can be created for the pedagogically informed holistic design of online degree programmes in higher education?*”. Four sub-studies were completed by using DBR as the main methodology to gain data from different participants through various data collection and analysis methods (see Section 5 for details of each sub-study). The data is used to inform the main research question, as well as to contribute to the educational design in HE research and online learning. The research questions of each sub-study were based on theoretical background literature with the aim to redesign the model in each cycle.

The aim of the first cycle was to create the initial model and accompanying design principles for holistic design from an organisational and pedagogical viewpoint to construct the basic infrastructure and conditions for ODPs to be offered as a new type of degree education in the context of a digitally competent organisation with a pedagogical strategy. The first sub-study focused on the context of the local HE organisation. The following three research questions were set in Sub-study I:

1. What kind of model can be developed for creating new ODPs in an HE organisation that uses a pedagogical strategy?
2. How can the pedagogical strategy be integrated in the design?
3. How can the organisation-wide requirements set by the fully online context for offering quality degree education be implemented in a digitally competent organisation?

The second sub-study continued the research in the organisational context and focused on the first ODP teachers as data subjects to gain their experiences about the initial model as practitioners in the implemented pedagogically informed design. With ODPs being a new type of education in the HE organisation, it was important to understand the support needs of teachers who are teaching in an ODP for the first time. The specific research questions set for Sub-study II were:

1. How do the online degree teachers experience the elements of the design?
2. How can their experiences be used to develop the ODP design further?

The third sub-study focused on students as users of the designed ODP. Since one of the new ODPs in the HE organisation was international, it was important to study how the international and intercultural aspects of the ODP should be

taken into consideration in the design, something that also came up in the teachers' answers in Cycle 2. Therefore, the international ODP was selected as the empirical case with the aim of investigating how ODP students experienced the international and intercultural aspects of studying in a culturally and linguistically diverse online study group where the instruction is conducted in English. The third sub-study expanded the understanding of student views in an international context of the HE organisation. The research questions in Sub-study III were:

1. How is internationalisation and interculturality experienced by students of an international online degree programme?
2. How can their experiences inform the holistic design of international online degree programmes?

The fourth and final sub-study concerned HE development in national collaboration where the focus was on establishing how ODPs could be completed as national cross-studies. ODP experts of a national Online Degree Working Group were used as data subjects to gain information about how the model could be utilised in the national context. Moreover, in this phase of the study, sustainable development was considered as an essential element of holistic design for the final framework, since all UASs made a commitment at the time of the research to implement SD goals in all degree programmes. The specific research questions in Sub-study IV were:

1. What elements of the initial ODP design framework created in Cycle 1-3 of DBR process are considered to be important by the national online degree working group for ODPs completed as cross-studies through national collaboration?
2. What elements are needed in designing ODPs completed through national cross-studies?
3. What elements are needed in integrating SD in designing ODPs completed through national cross-studies?

DBR approach was used to collect data to inform the research questions set for each sub-study. The following section explains the DBR cycles and phases of each sub-study.

4 Research Methodology

This study approaches research from a deductive, pragmatic stance through design-based research (DBR) methodology (Barab & Squire, 2004; Design-based Research Collective, 2003) that can be placed within educational design research (McKenney & Reeves, 2019; Goodyear, 2005). In pragmatic approach, knowledge and actions are closely connected (Juuti & Lavonen, 2006). Mixed methods were used to increase the reliability, validity and objectivity of DBR research (Wang & Hannafin, 2005). The methods applied during the research were mostly qualitative, although in some parts, quantitative methods were used to inform the qualitative part of the research.

Sub-studies I-IV were completed to create design principles that would result in the framework for the pedagogically informed holistic design of ODPs in HE where service design has been integrated. Triangulation (Eskola & Suoranta, 1998; Saldana, 2011) was used to ensure different viewpoints to answer the research questions set in the study. Each sub-study brought new information to creating the framework through specific research questions set for each cycle. All cycles included one or more phases. Table 1 below summarises the DBR process of sub-studies I-IV.

Table 1. Summary of the DBR process

	Sub-study I	Sub-study II	Sub-study III	Sub-study IV
Aims	To create the initial model and accompanying design principles for holistic design from an organisational and pedagogical viewpoint	Investigating the ODP teachers' experiences of the initial model to further develop the model and design principles	Examining the experiences of ODP students in an international and multicultural context to develop the model and design principles	Investigating ODP elements in the design of ODPs for national cross-studies and integration of sustainable development to develop the model and design principles
Main research question	What kind of model can be used for the pedagogically informed holistic design of a higher education ODP?	How do online degree teachers experience the initial model for the holistic design of ODPs?	How do online degree students of int'l ODP experience international and intercultural aspects of ODP education?	Which features are important in the holistic design of a sustainable national ODP?
Participants	Experts within the HE organisation (N=36 in Phase 3)	Teachers in the new ODPs (N=9 in Phase 1)	Students in the international ODP (N=59 in Phase 1, N=7 in Phase 2)	Experts in a national online degree working group (N=7 in Phase 1-2, N=4 in Phase 3)
Data collection methods	-Thematic literature search (Phase 1) -Integration of pedagogical strategy (Phase 2) -Expert consultations (Phase 3)	-Focus group interviews (Phase 1)	-Electronic questionnaire (Phase 1) -Thematic semi-structured interview (Phase 2)	-Electronic questionnaire (Phase 1) -Online visualisation and participatory design (Phase 2) -Thematic focus group interview (Phase 3) -Comparison (Phase 4)
Data	Theoretical data on ODP design in the context of a HE organisation	Transcribed interviews	Quantitative data from questionnaire; transcribed interviews	Quantitative data from questionnaire; visualisation; transcribed interviews
Data analysis	Comparative analysis	In vivo coding, three dimensions of experiences; comparative analysis	SPSS quantitative analysis; thematic content analysis	Comparative analysis
Publication	Sub-study I: Joshi, M.S. (2022), Holistic design of online degree programmes in higher education – a case study from Finland, <i>International Journal of Educational Management</i> , 36(1), 32-48. https://doi.org/10.1108/IJEM-12-2020-0588	Sub-study II: Joshi, M. & Kantola, M. (2022). Teachers' Experiences and Role in the Design Process of Online Degree Programmes in Higher Education. <i>Seminar.net</i> , 18(1). https://doi.org/10.7577/seminar.4698	Sub-study III: Joshi, M. & Varhelahti, M. (2022). Designing International Online Degree Programmes in Finnish Higher Education. <i>International Journal of Teaching and Learning in Higher Education</i> , 34(1), 45-59. https://iset.org/ijthe/pdf/IJTHE4256.pdf	Sub-study IV: Joshi, M. (2022). Sustainable development in the design of online degree programmes for national cross-studies. <i>Ammattikasvatuksen Aikakauskirja</i> , 23(4), 12–33. https://doi.org/10.54329/akakk.113318

The following section presents the DBR process and service design as the methodologies of the study. It is followed by a summary of the materials, methods and main results of each sub-study.

4.1 Overall research design

As part of a DBR process, it is important to provide rich descriptions of the context and the intervention, as well as the participants and the actual designed result with its impact on learning (Barab & Squire, 2004). The site of the research was Turku University of Applied Sciences (Turku UAS), which is a higher education organisation in the south-west of Finland. It has over 10,000 degree programme students in the fields of Technology, Communications and Transport; Health Care and Social Services; Business and Administration; and Culture, making it one of the largest UASs in Finland. (Turku UAS, 2021). Studies are working-life oriented and the employment rate after graduation is high, with most graduates employed in the region: out of 1,626 UAS graduates employed in south-western Finland after one year of graduation, 1,461 were Turku UAS graduates (Vipunen, 2020). Turku UAS actively participates in applied research projects nationally and internationally (Turku UAS, 2021).

Data collection and analysis were conducted in the four sub-studies with various methods. The participants in the research represented the target group well in all cases, since the ODPs in the local context were new at the time of commencing the research and therefore the number of participants was limited. The research utilises mostly qualitative methods, although quantitative methods were used in sub-studies III-IV to inform the qualitative part of the research. Deductive data analysis (Azungah, 2018) was used by coding the data into pre-existing categories created in Cycle 1. The analysis was done by the author in Cycles 1 and 4, whereas in Cycles 2 and 3 the author worked with two co-researchers and co-authors, one in each cycle. Their contributions are relevant in the analysis part as it increases the reliability and widens the viewpoint of interpretation of the results. The study is contextualised in the local, known context of the ODPs and theory, together with data collection, is used to build themes for the conceptual framework.

4.2 Design-based research

This is a design-based research study that comprises four cycles in four sub-studies completed in 2016-2021. The first sub-study represented an organisational approach where the frameworks of digitally competent organisation (Kampylis et al., 2015) and innovation pedagogy (Kettunen et al., 2013) were combined with expert

consultations to create a basis for the pedagogically informed design of ODPs. The second sub-study focused on teachers' experiences informing the design. The third sub-study centred around student experiences of international and intercultural aspects of ODP education. The fourth sub-study added a layer of sustainability into the design. In the study, the theoretical and empirical data collected in the four sub-studies were compiled and informed by service design, resulting in the pedagogically informed holistic framework. Figure 3 shows the DBR process in creating the holistic framework.

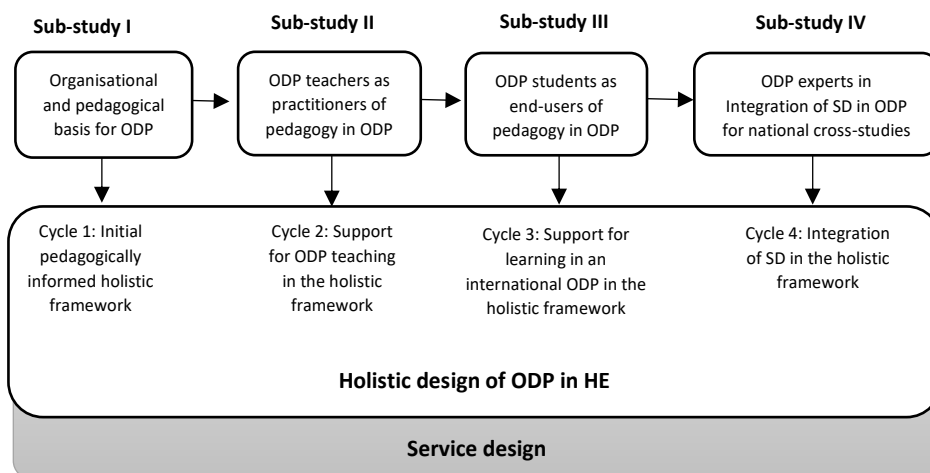


Figure 3. DBR process in the holistic design of ODPs in HE

This study is based on socially constructed and practically oriented realism. Epistemology refers to the systematic consideration of knowing and what is truth, whereas ontology refers to the consideration of what exists and what it means to be (Packer & Goicoechea, 2000). The nondualist view of sociocultural and constructivist ontology suggests that ‘the constructivist perspective attends to epistemological processes and structures that the sociocultural perspective is able to locate in an ontological process.’ and ‘...constructivist emphasis on the active learner must be added to the recognition that knowledge is not all that is constructed. The human individual is a construction too, as is the social world.’ (Packer & Goicoechea, 2000, 235). The view of knowledge in design is pragmatic and emphasises participation and experimentation through discourse as a tool for intervention (Romme, 2003). DBR is considered to be a suitable methodology for this study as it combines theoretical data to create a practical solution and it is further developed in the local context based on practitioners' experiences (Collins et al., 2004; Design-Based Research Collective, 2003). Indeed, DBR suggests that theory is developed to produce changes in the world (Barab & Squire, 2004). This

is done by enabling the use of mixed methods to reach the epistemological goals, i.e. conception of knowledge, of pragmatic problem-solving and informing future practices in situations where knowledge is socially constructed (Juuti & Lavonen, 2006).

In this study, mixed methods are used, which is typical in a DBR study. The sub-studies comprise various methods ranging from electronic surveys informing focus group interviews to visualisation and comparative mapping. The pragmatic focus is on the main research question, i.e., creating a practical model that can be used in the everyday reality of educational organisations who wish to design ODPs, thus the emphasis being on a practical solution to a specific context. The axiological approach in pragmatism is value-driven, where the researcher's own beliefs determine and maintain the values during the research (Saunders et al., 2019). The author's own values are part of the research (Azungah, 2018), which may increase subjectivity. This can be avoided by following general scientific research methods (Wang & Hannafin, 2005).

One of the essential features of DBR is that the researcher is an active participant of the research process and develops pedagogical processes in a local context (Collins et al., 2004). The author of the present study has been an active participant in the research process, wearing many hats during the process due to different roles in organisational and national contexts and evolving with the research. At the beginning of the study, the author was working as a teacher and, as part of the pedagogical support team of the HE organisation, was given the responsibility to coordinate the design process of the first ODPs of the HE organisation, and the initial model was created in Cycle 1. The author conducted Cycle 2 with a colleague from the Higher Education Research Group to further develop the model, but this time the role of the author had expanded from coordinating the design process to also operational management and coordination of the first international ODP. In Cycle 3, the author worked with a colleague who was not part of the ODPs but represented a research group that focused on communication, cultures and pedagogy. During that time, the author had also become one of the teachers in the international ODP. Finally, in Cycle 4, the author was the coordinator of the national online degree working group. All these roles meant that the author had a close connection to the research and was part of the local context, working with the research participants. To maintain an objective research view, the author followed scientific research processes to comply with the requirements of scientific research (Wang & Hannafin, 2005) and collaborated closely with others. All the sub-studies were completed following scientific requirements regarding data, participants and analysis.

Research experiments take place in a limited number of settings (Cobb et al., 2003). Amiel and Reeves (2008) suggest the strong researcher-practitioner partnership in DBR and its connection to real-world settings can add value to educational technology research. In the present study, DBR can be considered to

be a suitable methodology as the sub-studies II-III were placed in the real-world setting of the ODP design and education, thus giving the opportunity to collect data from the teachers as practitioners of the pedagogy (Jaramillo, 1996) as well as students as end-users of the pedagogy in the ODP. The ODP teachers' experiences in Cycle 2 are examined in the real-life context of the ODPs at the beginning of the implementation, informing the research of how the initial model is seen in the real context of the first ODPs of the HE organisation. The ODP students' experiences in Cycle 3 are examined in the real-life context of the implemented education, thus giving an opportunity to find out how the ODP education has been implemented after the refinement based on Cycle 2. Cycle 4 focused on the integration of SD in the design in the context of national ODP design and how national collaboration can support learning and teaching of SD in an ODP.

Juuti and Lavonen (2006) conclude that DBR consists of three main aspects: it produces an artefact applicable to a wider audience, is iterative, and offers new educational knowledge for e.g., designing educational innovations. In this study, the focus of research was the design of ODPs as a new type of education, therefore designing an educational 'innovation' in the local context of the HE organisation. There was a need for new educational knowledge regarding ODPs, designing online learning and, also, developing higher education for sustainable future. These were all important for the overall aim to create a framework for the holistic design of ODPs as an outcome that can be utilised by a wider HE community than just the local HE organisation. DBR typically creates a connection between theoretical studies and practical solutions that are created within educational research (Alghamdi & Li, 2013). There was no previous experience of ODPs in the HE organisation where the study took place, and therefore the need for both theoretical and empirical data existed. Theories can be developed through empirical data in case studies where multiple methods are used to provide information or to test or develop a theory (Eisenhardt, 1989).

Theoretical and empirical data was collected in four sub-studies, starting with a literature search to create a basic understanding of online degree design principles and processes of developing ODPs as a new type of education in Cycle 1. The empirical data in Cycle 1 was collected from experts within the organisation to ensure the theory could be implemented in practice within the organisation. Cycle 1 included 3 phases in total with different method and focus. This was followed in Cycle 2 by expanding the understanding of the roles of teachers in the design process and learning about their experiences of teaching in a fully ODP for the first time. The empirical data that completed the theoretical data came from the first ODP teachers in the HE organisation. In Cycle 3, theoretical information was collected regarding the roles of students as designers and their experiences of studying in an ODP, which was also an international one, thus increasing the understanding of the expectations and requirements for designing ODPs in the intercultural and

international context. This was complemented by empirical data from the ODP students in the international ODP. Finally, in Cycle 4 theoretical information about sustainable development goals and competences in HE was researched and combined with information about national collaboration. The empirical data was collected from the national online degree working group.

According to Cohen et al. (2007), in educational research the word model can be used interchangeably with the word theory. They state that both words can be used to describe a conceptual framework, but a model often refers to a graphic form to represent the key issues of the phenomenon (Cohen et al., 2007). Edelson (2002, 114) defines the term 'design framework' as follows:

“A design framework is a generalised design solution. Although design theories are descriptive, design frameworks are prescriptive. They describe the characteristics that a designed artefact must have to achieve a particular set of goals in a particular context”

In design-based research, the purpose of the created artefact, in this case the design framework, is not to be perfect but rather be a practical tool for the user in their own context and using their own competences (Juuti & Lavonen, 2006). Therefore, the framework can be utilised by any educational organisation or practitioner one in their own context by integrating the elements and design principles into their own reality. The accompanying design principles (Amiel & Reeves, 2008) offer more detailed information and characteristics of the elements in the framework.

The model and design principles were developed following each cycle, refining the model based on the theoretical and empirical data collected. The present study and its cycles are significant in the process of designing and implementing the initial model in terms of timeline: the initial model was created in order to construct the first ODPs in the HE organisation, where there was no previous experience of ODPs in Cycle 1. Design experiments are valuable in that they “...ideally result in greater understanding of a learning ecology - a complex, interacting system involving multiple elements of different types and levels-by designing its elements and by anticipating how these elements function together to support learning” where the study of function is at the heart of the methodology (Cobb et al., 2003, 9). In the present study, the learning system as a focus of the design is the model for the holistic design of ODPs, which includes elements to be implemented in the use of the model. It is the testing and refinement of these elements within the model that is at the centre of this study.

DBR is situated in a real-life educational context, where the focus is on the design and testing of a significant intervention by using mixed method and involving multiple iterations in a collaborative partnership between researchers and practitioners, resulting in design principles (Anderson & Shattuck, 2012).

As an iterative research process, systematic refinement takes place in cycles of design-reflection-design and results in design principles which can be utilised by others interested in the topic (Amiel & Reeves, 2008). In a DBR study, design principles are created as outcomes of a development study where a solution to a complex problem is sought through an intervention that is based on research (Plomp, 2007) and can link theory into practice (Paavola et al., 2011).

In this study, the author created design principles in the local context of the educational organisation with the overall aim of creating a framework for the holistic design of online degree programmes in higher education. The design principles from the first sub-study listed the principles in the three-tiered holistic design framework in three layers: organisational, pedagogical and ODP design layer, and all subsequent design principles were categorised in these three layers. The design principles as an outcome of the second sub-study listed the design principles for the holistic design of ODPs based on the teachers' experiences. The third sub-study resulted in principles for designing international ODPs in a multicultural and multilingual setting. The outcome of the fourth sub-study presented results for the integration of sustainable development in national collaboration for ODPs as cross-studies. The design principles of each sub-study are presented in Chapter 5.

The design principles were used to create design elements to be placed in the final framework. Following the creation of the initial model in Cycle 1, the elements were presented to the teachers in Cycle 2 and modified and complemented with new elements after the completion of that cycle. In Cycle 3, the elements were not presented to the students, but however, were modified and complemented with new elements based on the students' experiences. In Cycle 4, the elements were again presented to the online degree working group to be examined and prioritised for the ODPs as national cross-studies. The design elements of each sub-study are presented in Chapter 5.

4.3 Service design

The final framework created as a result of the above-describe sub-studies was further informed by elements of service design, as this study focuses on the construction of ODPs as a new type of education to create meaningful teaching and learning experiences for the end-user. Therefore, a more user-focused approach was needed to complement the researcher-practitioner approach of DBR. Service design can support the process of DBR through user-focused approach (Keskitalo & Vuojärvi, 2018). The teachers as the practitioners (Wang & Hannafin, 2005) and designers (Laurillard, 2012) of the pedagogy provide the education that the user, i.e. the student, receives with the HE organisation as the provider of the education and support services. The service in the online degree context effectively refers to

degree studies in HE that are conducted online. The service design goals for the ODPs are to create useful and meaningful learning experiences by offering a high-quality education and support services online, supported by technical solutions and pedagogical strategies in the new culture and community of the ODPs. Design can be approached on three levels of an organisation: strategic, tactical and operational level (Best, 2015). In this study, design is approached on three levels: organisational, pedagogical and online degree programme level.

To answer the user-focused need for the design, Moritz' (2005) four levels of service design approach were placed in the context of designing ODPs as new educational services in higher education (Joshi, 2018). Table 2 shows the service design levels in the context of ODP design as they have been approached in this study. The ODP elements listed in the table are used in the integration of the four service design levels into the holistic design framework.

Table 2. Levels of service design in holistic online degree programme design

Service design level (Moritz, 2005)	ODP elements in the holistic design
1: Design of features (product, service, space)	ODP curriculum and course design, ODP teaching and learning environments, support services online
2: Design of client experience	ODP teaching and studying in local, international and national contexts, online community
3: Design of processes and systems	Pedagogical approach online, ODP support services, training, and collaboration
4: Design of strategy, philosophy, policy, ideology	Organisational strategy for creating ODPs as new educational services, pedagogical strategy, integration of sustainable development, quality frameworks, internationalisation

Following the creation of the framework and the accompanying design elements and principles in Cycles 1-4, the service design levels (Moritz, 2005) were integrated to the design framework by placing the ODP elements presented in Table 2 in the framework. This resulted in the holistic design framework for ODPs as a new type of education to create meaningful learning experiences in HE. The final framework and the accompanying design elements and principles are presented in Chapter 6.

The following section presents each sub-study by first explaining the data, material collection and analysis methods, followed by an evaluation of the main results.

5 Overview of the Sub-Studies

5.1 Sub-study I: Holistic design of online degree programmes in HE

Participants and data

Sub-study I focused on creating the initial model for the holistic design of ODPs in the context of the local HE organisation. The data was collected in Cycle 1 of the DBR process and included three phases. The purpose of the sub-study was to identify relevant ODP design principles from previous literature to create the basis for the model. The model was then informed by pedagogy through integration of the pedagogical strategy of the HE organisation used in all its operations. It was important to consider how the organisation could implement the pedagogically informed educational and support services in the online context. The resulting initial model can be used by managers, coordinators and educators who are interested in creating new online ODPs in digitally competent HE organisations that use a pedagogical strategy.

The DBR Cycle 1 consisted of three phases, where the first one focused on ODP design, the second phase on the pedagogically informed design and the third on organisational design. The data was collected in Phase 1 by using literature search and review by the author. The search was conducted in autumn 2016 by using various key words in the Nelli database, which at the time of the search was changing in the HE organisation to a newer system that offered wider search capabilities. The key words used were online degree programme, virtual degree, digital degree, higher education, design, model, quality, and the search were limited to the field of HE. The resulting literature included various types of research, varying in focus from administrative and qualitative to disciplinary differences. The literature that focused on quality were selected for further analysis.

The data in Phase 2 was the pedagogical strategy of the HE organisation. The collection of theoretical data included the details of the pedagogical strategy, such as cornerstones and competences of innovation pedagogy (Kettunen et al., 2013; Penttilä et al., 2013). The empirical data in Phase 3 were expert consultations (n=36) with experts representing different areas of a digitally competent organisation, including degree programme managers and coordinators, IT support services, pedagogical support, health services and library services. The data comprised thematic consultations regarding the implementation of the pedagogical strategy and the ODP principles in the new ODPs in the digital context of the organisation.

The consultations were held as group meetings in 2017 by the author and the meeting notes were recorded as written documents.

Data collection and analysis

The analysis of Phase 1 focused on online degree programme layer design and was a qualitative analysis that was conducted as a thematic expert discussion in the pedagogical team of the HE organisation based on the literature search completed by the author. The aim of the discussion was to identify those frameworks and principles that were related to holistic design of quality ODPs in HE. The framework of Digitally Competent Organisation (DigCompOrg, Kampylis et al., 2015) was selected at this time to be used as a framework for creating ODP education and services that would be implemented fully online in the HE organisation. This was very important as the HE organisation had not offered fully online degree education previously and therefore many of the educational and support services were not designed to be offered by the means of online tools and methods. At the end of this phase, a list of design principles from the selected background literature was created for the ODPs.

In Phase 2, the focus was on pedagogical design where the author integrated the pedagogical strategy of the HE organisation to the list of the design principles identified in Phase 1. The author identified which part of the pedagogical strategy related to which ODP design principle and combined the principles of the pedagogical strategy into the list of ODP design principles from Phase 1. In Phase 3, the author first compared the elements of DigCompOrg (Kampylis et al., 2015) to the elements identified in Phases 1-2 to create the layers for the model. The author then examined the meeting notes from the thematic consultations and placed them in the framework of DigCompOrg to identify how each of the eight elements and the sub-elements could be implemented in the ODP.

The key design elements and principles for the holistic ODP design were identified based on the comparison of all data from Phases 1-3. The elements were placed in a nested diagram to illustrate how the different levels of design from Phases 1-3 were connected. The first layer was the organisational layer, where the readiness and preparedness for the ODPs is determined by e.g., preparing strategies and examining quality. The second layer represents the pedagogically informed design, where the pedagogical strategy of the HE organisation is considered in the structure and operations of the ODP. The third layer describes the ODP where quality learning experiences are offered to ensure that the ODP education is experienced as intended in terms of organisational, pedagogical and digital strategy.

Overview and evaluation of the results

The major contributions of this sub-study were the organisational approach to ODP design and the initial model for the pedagogically informed holistic design of ODP in HE with accompanying design principles (Figure 4).

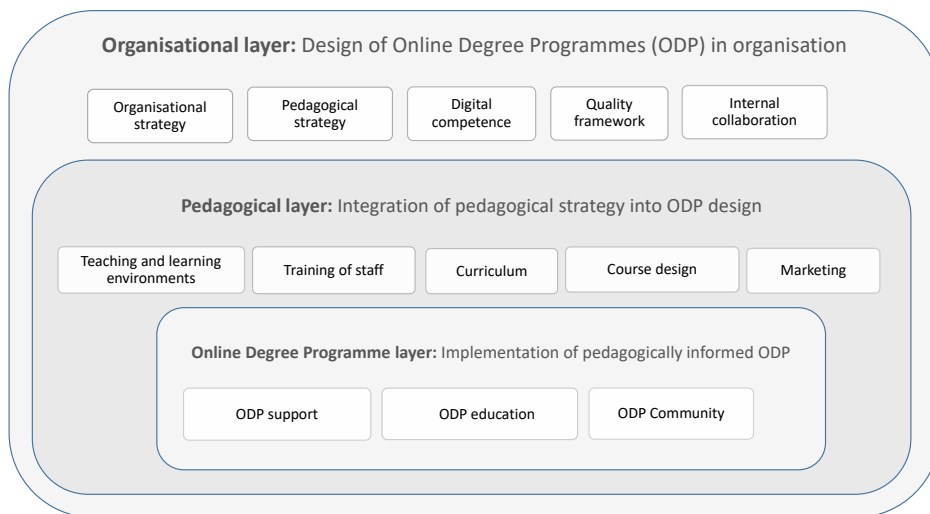


Figure 4. Initial three-tiered holistic design model (Joshi, 2022a)

The resulting model and design principles are relevant for organisations who are planning to create new ODPs in their organisation, as they offer a starting point for the programmes at the organisational level and increase understanding of how the pedagogical strategy of the organisation can be implemented in a fully online context of an entire HE degree. It also serves as the first example of using innovation pedagogy as the pedagogical strategy in the design of an ODP. Moreover, it offers the organisation the possibility to approach the design of new ODPs from a qualitative point of view, as the frameworks utilised in creating the model included a quality aspect. The design principles explain the use of the model and allow organisations to place the model in their local context and purposes. In this sub-study, disciplinary differences were not considered. However, the model was utilised in a project to create fully online preparatory programme for immigrant background students entering HE, where collaboration was found to be a central element to the holistic design. Collaborative design was applied in three design levels, where the second and third level were field-specific (see Joshi & Hirard, 2019, 55, Figure 1). This experiment adds value to the present research as it shows that whilst the disciplinary differences were not included in the initial model for the design of online degree programmes, the model can be utilised in the design of programmes where different disciplines exist. As the main aim of this entire study was to design ODPs as a new type of education and support services in the HE organisation, one possible downside of the model identified in Cycle 1 was the focus on the organisation rather than the service.

The results of the first sub-study were published in an article in November 2021, with the issue publication in January 2022. The author of this dissertation was the sole

author of the article titled ‘Holistic design of online degree programmes in higher education – a case study from Finland’ in a journal of educational management.

Design principles and elements

Cycle 1 resulted in the initial model and the first set of design principles and elements that were to be developed in the following Cycles 2-4. In the first sub-study, the design principles and elements were presented on the three-tiered model as follows (Table 3).

Table 3. Sub-study I Design elements and principles for holistic design

Organisational layer	
Design elements:	Organisational strategy; Pedagogical strategy; Digital competence; Quality framework
Design principles:	<ul style="list-style-type: none"> • Choose strategic starting points for the online degree programmes, including pedagogical, digital and design strategy • Check digital competence of the organisation for provision of strategic approaches in online degree programmes • Assess quality to ensure application of strategic approaches in online degree programmes • Collaborate for organisation-wide consistency in application of strategic approaches in online degree programmes
Pedagogical layer	
Design elements:	Internal collaboration; Teaching and learning environments; Training of staff; Curriculum; Course design; Marketing
Design principles:	<ul style="list-style-type: none"> • Create online and on-site environments that support the implementation of the pedagogical strategy in a digitally competent organisation • Train staff to apply pedagogical strategy and utilise elements of digitally competent organisation in implementing online degree programme education • Make elements of pedagogical strategy and digital competence visible in the curriculum design • Create design templates for the online learning environments that enable and enhance the implementation of pedagogical strategy in implementing online degree programme education • Market pedagogical strategy as a differentiator for online degree programmes in a digitally competent organisation
Online degree programme layer	
Design elements:	ODP support; ODP education; ODP community
Design principles:	<ul style="list-style-type: none"> • Provide continuous pedagogical, technological, and organisational support for the staff and students in the online degree programmes • Provide online degree programme education that is consistent with strategic approaches and meets the quality criteria • Support the staff and students’ wellbeing in belonging to an online degree programme community as part of the educational organisation

The principles and elements were refined after Sub-study I to include the teachers’ view of the initial model.

5.2 Sub-study II: Teachers' experiences and role in the design process

Participants and data

Sub-study II focused on gaining the experiences of the initial model from those ODP teachers (n=9) who were involved in the initial stages of the design of the first three ODPs in the educational organisation. The data was collected in Cycle 2 of the DBR process and included one phase, which was a thematic focus group interview conducted together by both authors of the subsequent article. The purpose of the sub-study was to gain an understanding of the teachers' experiences of the initial model created in Cycle 1. Teachers were considered as practitioners of the pedagogical processes and approaches, and teachers' experiences (Badia et al., 2019) were considered relevant for this phase of the study. Moreover, the teachers' role in the design process (Kali, 2015) of ODPs as a new educational service in the HE organisation was interesting, and their experiences could offer new information regarding teachers as designers (Laurillard, 2012). The results showed interesting new aspects of teachers' role and their perspectives on the design of ODPs in the organisation. The results can be utilised by managers, coordinators and designers of new ODPs to better understand the role of ODP teachers in the design process as well as the support needs they may have.

Data collection and analysis

The research data was collected during two one-hour data sessions with two groups of the ODP teachers. The interviews were held in two languages, one in Finnish and one in English, as some of the participating staff were English speakers and it was more natural for them to give their answers in English. The groups consisted of teacher tutors and responsible teachers of the three first ODPs to be created in the HE organisation. In total, 9 persons were interviewed. For the English interview, 4 out of 9 teachers involved in the design of the international degree programme were invited, all of whom attended the interview (n=4). Three attended in person whilst one attended via Skype for Business online meeting. For the Finnish interview, all five involved in the development of the Finnish degree programmes were invited and attended the interview (n=5). The coordinators of the ODPs were not invited as it was considered that they were closely involved in the design process and therefore their perspectives may not reveal enough about the experiences of the initial model.

The data set consisted of 2:08:39 minutes of recordings, which were transcribed verbatim by each of the authors, so that one transcribed the Finnish data set and the other transcribed the English one. The analysis of the data in Cycle 2 was deductive, (Azungah, 2018), where data was coded into pre-existing categories created in Cycle 1. It involved an individual analysis stage where each author coded the data by categorising it in three dimensions to reflect the experiences of the teachers:

negative, positive and new suggestion. The frequencies of the experiences were noted and placed in the elements of the initial ODP design model from Cycle 1. After the individual analysis part, the authors discussed the results in one data session and highlighted the three highest frequencies in each dimension. New design principles and elements were created based on the teachers' experiences and these were added to the initial set of design principles created in Cycle 1.

Overview and evaluation of the results

As a result of Cycle 2, the design principles based on the ODP teachers' experiences were added to the initial model created in Cycle 1 (Joshi, 2021). The design principles were allocated in the three layers of the model: Organisational, Pedagogical and Online degree programme. The major contribution of this sub-study was that by involving the ODP teachers in the design process, new suggestions were gained to the model from the perspective of the teachers as practitioners of pedagogy. Moreover, by revealing their positive and negative experiences, it was possible to determine the kind of support that teachers would require in the design of new ODPs. Also, as one of the main objectives was to create quality educational services that would be experienced as intended, it was important to collect teachers' experiences so that internal collaboration and the sharing of good practices could be enhanced to enable consistency within the services throughout the HE organisation, which was one important factor for the study.

This sub-study also gave new information about teachers' changing role in the different setting of a fully online degree programme and showed how important it is for the HE organisation to be aware of the teachers' professional identity holistically, combining both online and onsite teaching contexts of the organisation. In this sub-study, one of the findings was that teachers felt the model could be utilised for both online and blended degrees. The model was tested already in 2019 when the author took part in a national project to create fully online preparatory programme for immigrant background students entering higher education, and the model was used in creating the online implementation for the preparatory programme (Joshi & Hirard, 2019). This has extended the understanding of holistic design approach to other online programmes that may not be degree-leading but are offered fully online. One possible limitation of utilising the results of the Cycle 2 is that the ODP teachers were all new to fully online teaching and therefore their views may be limited in terms of ODP design or implementing ODP education.

The process and results of the second sub-study were reported in the article titled 'Teachers' Perspectives and Role in the Design Process of Online Degree Programmes in Higher Education', which was accepted for publication in April 2022 in a Scandinavian educational journal. The author of this dissertation co-wrote the article together with the co-researcher of the Sub-study II.

Design principles and elements

In Cycle 2, the design principles were created after analysing the data that showed the teachers' experiences of the initial model created in Cycle 1. The data was compared with the design principles from Cycle 1 and only those that were not yet included in the initial model or design principles were selected to create new design principles. The key elements were selected from the design principles that were created based on the teachers' experiences. The design elements and principles after the Cycles 1-2 show the support needed for ODP teaching on the organisation, pedagogy and online degree programme design layers (Table 4). The modified or new design elements are shown in italics.

Table 4. Sub-study II Design elements and principles for supporting ODP teachers

Organisational layer	
Design elements:	Organisational strategy; Pedagogical strategy; Digital competence; Quality framework; Internal collaboration; <i>Organisational community onsite and online; Management support; Future predictions and redesign</i>
Design principles:	<ul style="list-style-type: none"> • Include organisational community, management support and future predictions and redesign based on those • Enable interna collaboration not only to create consistency but to create a link between the online and onsite community • Enable internal collaboration amongst the ODP staff in different degree programmes • Make collaborative activities as well as co-creation and co-design central in the design process of a new ODP • Offer managerial support in implementing new initiatives in education • Allow discussions between various stakeholders of the organisation during the design process • Create a sense of community and belonging throughout the organisation • Give teachers opportunities to link their online teaching role to the onsite role
Pedagogical layer	
Design elements:	<i>Extended teaching and learning environments online and onsite; Training of staff, mentoring and sharing; Support for pedagogy and technology; Online and blended curriculum design; Collaborative course and template design; Marketing of online study and teaching methods</i>
Design principles:	<ul style="list-style-type: none"> • Offer possibilities for collegial support and sharing of experiences and solutions in terms of professional training, mentoring and collaborative design. • Give support for both the pedagogy and technology in the various environments of the ODP, extending from campus to home and from online to onsite. • Inform future students of the pedagogical solutions in the online environments better through marketing
Online degree programme layer	
Design elements:	<i>Pedagogical, technical and collegial support for ODP community; ODP education through co-creation and co-teaching; ODP community as part of the organisation; Online and onsite community for collaboration; ODP in an international context</i>
Design principles:	<ul style="list-style-type: none"> • Facilitate the need to belong to both online and onsite community of the entire organisation for both students and staff. • Support their need to collaborate and be supported in the ODP and as part of the the organisation. • Support their needs of the ODP education and community in international and intercultural contexts • Include online degree teaching staff and students as active participants in the co-design of an ODP

The principles and elements were refined after Sub-study II to include the students' experiences of international and intercultural aspects of ODP studying.

5.3 Sub-study III: Designing international online degree programmes

Participants and data

Sub-study III focused on creating design principles for designing ODPs in international and intercultural contexts in Finnish HE. The data was collected in Cycle 3 of the DBR process and included two phases, quantitative and qualitative. The purpose of the sub-study was to collect experiences from those students studying in the first international ODP in the HE organisation to create design principles for designing international ODPs. The participating students' (n=59 in Phase 1, n=7 in Phase 2) views were considered to be relevant at this stage of the research as the first ODPs had been implemented by using the initial model created in Cycles 1-2, and the students' experiences as end-users of the degree education would reveal if they experienced the pedagogically informed framework as intended.

Also, their experiences could show the kind of support needs that students would have in an ODP that is implemented in a multicultural virtual context where the participants represent different cultural, linguistic and online education backgrounds. This cycle was especially important as it added an international context to the ODP design, which had been considered only from the organisational viewpoint in Cycles 1-2. The resulting design principles can be used by managers, coordinators and educators who are interested in creating new online ODPs in an international context and who wish to include culturally aware design in the ODPs.

Data collection and analysis

The research data was collected in two phases, where in Phase 1 quantitative methods were used to collect data through an electronic survey, and in Phase 2 qualitative methods of a thematic semi-structured interview were used. The statements in the Phase 1 survey were based on the background literature that focused on the internationalisation and intercultural aspects in an online context in HE. The quantitative data in Phase 1 was collected in 2019 by sending an email invitation to participate in the survey to all students in the BBA in International Business Online degree programme who were registered as students in the degree programme at the time of the survey. Out of 100 students, 59 answered the survey, making the total response rate 59%. The result can be considered to be valid and relevant, as all students were included in the data collection.

As part of the Phase 1 survey, students were asked if they would like to take part in a qualitative focus group interview to gain a deeper understanding of their views after the initial analysis of the survey. In Phase 2, seven students who had volunteered to take part in the interview took part in a data collection session which was held as an online session, as they were all in different geographical locations and time zones. The interview group can be considered to be a good representation of the

international online degree programme as they represented different backgrounds in terms of cultural and linguistic diversity as well as their online and international study experience. None of the interviewees spoke English as their native language. The data session lasted for one hour and was recorded, it was held in English by the first author and the questions were based on the most important themes identified in Phase 1.

There were two themes, where the first one focused on online degree students in an international online degree, and they were asked about the kind of support students need for working in multicultural groups online, how their cultural background influences their online presence, and how having international students in degree programmes adds value to online degree studies. In Theme 2, the focus was on online degree teachers in an international online degree, and the students were asked about the kind of training that teachers need in intercultural communication skills, the kind of training teachers need in designing courses for multicultural groups, and the kind of communication tools teachers should choose for their courses for multicultural groups. The interview recording was transcribed verbatim by the main author. The participants were informed that in the analysis phase the data would be coded for thematic analysis and therefore individuals would not be identified.

The data from Phase 1 was analysed by both authors together by using the SPSS quantitative analysis tool and the following analyses were conducted: descriptive statistics of the statements, nonparametric Mann-Whitney U test and nonparametric Spearman's correlation measure. In addition, background variables were tested to find out if they influenced the experiences. Finally, the correlation of statements were examined to find out possible tendencies regarding experiences. The data from Phase 1 was used to create the questions for the Phase 2 interview. The interview results were analysed by coding each interviewee's answer (A-G) before the analysis by the first author to maintain the anonymity of the interviewees for the analysis. Deductive analysis was used by inserting the data into pre-existing themed questions created in Phase 1 to gain information for creating the design principles. At the end of Cycle 3, the author reviewed the design principles created in Cycle 3 for designing international ODP and connected the key elements with the previous elements from Cycles 1-2.

Overview and evaluation of the results

The major contributions of this sub-study were the international and intercultural approaches to ODP design and the revealing of students' support needs and suggestions for the development of pedagogical approaches in multicultural virtual settings. The results are relevant for organisations who are planning to create new ODPs in international contexts, as the design principles offer viewpoints to managers and educators to plan pedagogical implementations of the education. Moreover, the sub-study adds value to this study as it offers information about studying in an

international ODP where multicultural virtual groups study in various locations and time zones, something that is likely to increase in the coming years with the fast-changing landscape of online education following the COVID-19 pandemic (OECD, 2021).

The results of this study reveal interesting new notions about both teachers' and students' roles and support needs in multicultural virtual settings, as students reflected on both their own work and role as recipients of the education in the degree but also on the teachers' work and role as providers of the education in the degree. The results also reveal how the students feel about the HE organisation's internationalisation efforts in the context of an ODP. The model after the Cycles 1-3 showed the design elements and principles from the viewpoint of the organisation, pedagogy, support needed for ODP teaching and support needed for studying in an international and intercultural ODP setting.

The research process and results of the third sub-study were reported in the article titled 'Designing International Online Degree Programmes in Finnish HE', which was accepted for publication in an international journal that focuses on learning and teaching in higher education in early 2022. The author of this dissertation co-wrote the article with the co-researcher of Sub-study III.

Design principles and elements

In Cycle 3, new design principles were created to show the international and intercultural aspects to be considered in the holistic design of international ODPs. The key elements were selected after creating the design principles based on the students' experiences and compared against the previous elements from Cycles 1-2. The design elements and principles after the Cycles 1-3 show the students' viewpoints of international and intercultural aspects of ODP studying on the design layers of the organisation, pedagogy and online degree programme (Table 5). The modified or new design elements are shown in italics.

Table 5. Sub-study III Design elements and principles for international ODP studying

Organisational layer	
Design elements:	Organisational strategy and culture; Pedagogical strategy; Same digital tools and working methods to enable equal access and competence; Digital competence; Quality framework; Internal collaboration; Organisational community onsite and online; Management support; Future predictions and redesign
Design principles:	<ul style="list-style-type: none"> • Present a clear organisational culture from the beginning of the online degree studies • Use the same digital tools and working methods to enable equal access and competence irrespective of location
Pedagogical layer	
Design elements:	Extended teaching and learning environments online and onsite; Training of staff, mentoring and sharing in online teaching, use of online learning environments, intercultural communication and leadership skills for culturally diverse groups; Support for pedagogy and technology; Online and blended curriculum design; Collaborative, standardized and culturally aware course design; Marketing of online study and teaching methods
Design principles:	<ul style="list-style-type: none"> • Create standardized online course structure with culturally diverse contents and materials • Train teachers and students in intercultural communication online from the beginning of the online degree studies to enhance understanding of other cultures • Train teachers in online teaching skills and using online learning environments for culturally diverse groups • Enhance teachers' leadership skills for leading and supporting culturally diverse teamwork online
Online degree programme layer	
Design elements:	Pedagogical, technical and collegial support for ODP community; ODP education through co-creation and co-teaching; Multicultural staff and student ODP community as part of the organisation; Access to wider online and onsite community for collaboration, ODP in international context; Cultural etiquettes, shared rules and ways of working for respecting cultural identities in multicultural virtual teams
Design principles:	<ul style="list-style-type: none"> • Support cultural distance from the main culture of the online degree programme by introducing cultural etiquettes • Create shared rules and jointly agreed ways of working in a culturally and linguistically diverse online context • Give access to wider international community via online means • Have a cultural mix of international students and staff members in the online degree programme • Showing respect to individual cultural identities within culturally diverse virtual teams

The principles and elements were refined after Sub-study III to include the views of national expert group to integrate SD into ODP design for national cross-studies.

5.4 Sub-study IV: Sustainable development in the design for national cross-studies

Participants and data

Sub-study IV focused on the integration of sustainable development (SD) in the design of ODPs for national cross-studies. The data was collected in Cycle 4 of the DBR process and included three phases. The data was collected from a national online degree working group whose views were considered to be relevant as they represented different UAS's and study fields with various ODP expertise, and they were involved in the national development work of ODPs as cross-studies. The need for this sub-study was raised after all HE organisations committed to the sustainable education goals (ARENE 2020; UNIFI 2020) where one of the listed objectives

is that all degree programmes should integrate SD as well as produce graduates with basic sustainable development competences. In addition, the author was the coordinator of a national working group that developed practices and shared information regarding online degree programmes, which created the need for the context of national cross-studies.

The model that was developed in Cycles 1-3 was used as a starting point to prioritise principles for national cross-studies. After that, the relevant features of ODP design for national cross-studies were examined, and finally sustainable development integration to the design was examined through a thematic focus group interview. The resulting model can be used by managers, administrators and educators of ODPs in He organisations who are interested in focusing on SD in the design phase of the new ODPs.

Data collection and analysis

The data was collected in Phase 1 by using an electronic questionnaire to prioritise the important features of ODP design for national collaboration. Phase 1 was initiated in early 2020. The quantitative data was collected by using an online questionnaire that was sent to the national online degree working group that comprised seven participants from six universities of applied sciences. The questionnaire consisted of 18 statements formulated from the elements of ODP design created in DBR Cycles 1-3. All of the participants responded to the questionnaire. In Phase 2, the methods of service design were utilised to collect the data from the group (N=7).

An online participatory design process was used to collect data using a feature tree visualisation. The basis for the feature tree was taken from the ODP design elements created in DBR Cycles 1-3. The participants were asked to add, remove or change features of the tree to show relevant elements of the model for national cross-studies. The results of the participatory design process were used to determine which elements were important for the national cross-studies and were also later used as a basis for participatory workshops held with teachers of different UASs as part of a national project eAMK to create national visions for future ODPs.

In Phase 3, the members of group were invited to participate in a thematic focus group interview via an email invitation. In total 8 were invited, out of which 4 accepted, 2 did not respond and 2 declined. The data session was a one-hour online session, and it was recorded and transcribed. The participants were informed that the data would be analysed as thematic data and, therefore, individuals or organisations would not be identified. The interview was held by the author and the session was structured according to questions that were based on Phases 1-2 and the background literature on SD, and were shared with the participants beforehand. The author presented the ODP principles and the SD goals for Finnish applied UASs at the beginning of the meeting to ensure a shared understanding of the topics. In Phase 4, the data consisted of the key SD competences that were

identified after searching background literature to find key competences and their definitions.

The data in Phase 1 was analysed by looking at the mean scale and standard deviation of the total answers. As the purpose of this phase was to reveal the prioritised design elements for the design of national ODPS for cross-studies, the elements were arranged from highest to lowest in priority according to the mean. The standard deviation was used to examine the possible variance in the answers, which would then be considered in the final results. In Phase 2, the results were analysed by examining the modifications made to the feature tree, as well as considering which parts remained the same, as in qualitative research it is important to not only understand what has changed but also what has remained the same. In Phase 3, the transcribed data was arranged according to the themed questions and analysed question by question to show the perspectives of the online degree working group experts. In Phase 4, the key competences were combined into a table of six main competences, and then compared against Phase 1 and Phase 3 results to determine which SD competences to integrate in the design of ODPs completed through national cross-studies. As a result of Cycle 4, recommendations were made for the integration of SD competences in the design of ODPs completed as national cross-studies.

Overview and evaluation of the results

The findings highlighted the importance of national level collaboration in the design of ODPs to reach the SD goals of HE organisations in Finland. It was concluded that national level collaboration may enhance multidisciplinary work and, through integration of SD goals, develop students' SD competences. This was seen as possible especially in curriculum work, confirming previous literature that emphasises the need for curriculum development (Rohweder & Virtanen, 2009; Tilbury, 2019; Brundiers et al., 2020; Lozano et al., 2017), but adding an interesting new aspect of creating new types of degree studies and integrating SD in the working life that is at the centre of competence-based education utilised by many of the Finnish HE organisations.

The results showed a focus on pedagogy rather than technology, which is important for this study, but also raises needs for further research as deviation was seen in the answers related to technology. Some differences were seen in the results between phases 1-2 and 3, for example revealing many suggestions for students' competence needs but none for staff, which differed from background literature where the competence of staff was identified as being equally important. In terms of this study, this result is relevant as in Cycles 1-3, staff's training needs were highlighted more than those of the students. The major contributions of this sub-study were the integration of SD competences in the ODP design and focusing on national level collaboration in the integration of SD in the design of ODPs completed as national cross-studies.

This sub-study adds significant value to this study as it presents the ODP design in the national context and highlights the development work done on a national level amongst all HE organisations to develop quality ODPs, as it was found that both SD and ODP design aim to produce quality education to create an impact on the surrounding environment. Moreover, both SD and ODP design can create new solutions for the future by creating a handprint of education through accessibility to studies, competences, and decreasing carbon footprint by choosing online study mode.

The research process and results were reported in an article titled ‘Sustainable development in the design of online degree programmes for national cross-studies’ and was published in a Finnish academic journal in 2022. The author of this dissertation was the sole author of the article.

Design principles and elements

From Cycle 4, the design principles were created to reveal the importance of national level collaboration where sustainable development is integrated in the design of online degree programmes in higher education. The key elements were selected and compared against the elements from previous cycles 1-3. At the end of Cycle 4, the principles and elements include the integration of SD in national collaboration on the three design layers (Table 6). The modified or new design elements are shown in italics.

Table 6. Sub-study IV Design elements and principles for integration of SD in ODP

Organisational layer	
Design elements:	Organisational strategy and culture; <i>Holistic approach in integrating SD into ODP by focusing on quality, accessibility, availability, openness and agility</i> ; Pedagogical strategy; Same digital tools and working methods to enable equal access and competence; Digital competence; <i>Enhancing quality framework by including impact of ODP as a study mode to calculate carbon footprint</i> ; Internal collaboration; <i>National collaboration to integrate SD goals and support SD competences through various actions</i> ; Organisational community onsite and online; <i>National organisational ODP community to promote student wellbeing and create new possibilities for international collaboration and exposure</i> ; Management support; Future predictions and redesign to create new types of degree studies and agile ways of achieving the needed SD competencies
Design principles:	<ul style="list-style-type: none"> • Take a holistic approach in integrating SD into ODP by focusing on quality, accessibility, availability, openness and agility in ODP studies that enable the achievement of SD competences for future professionals in working life • Consider national level collaboration possibilities to support the co-operation and communication sustainability competency through various actions in online degree programmes, such as multidisciplinary work, professional development, curriculum development, supporting community and international exposure • Collaborate nationally to create and support an ODP community, which in turn can promote student wellbeing and create new possibilities for international collaboration and exposure. • Enhance quality education by including the impact of ODP as a study mode to calculate the carbon footprint • Include future visions and foresight in the design of ODPs to create new types of degree studies and agile ways of achieving the needed SD competencies
Pedagogical layer	
Design elements:	Extended teaching and learning environments online and onsite; Training of staff; Mentoring and sharing in online teaching; Use of online learning environments; Intercultural communication and leadership skills for culturally diverse groups; Support for pedagogy and technology; <i>Integrating SD in Online and blended curriculum design, thesis work, project work and working life collaboration</i> ; Collaborative, standardized and culturally aware course design; Marketing of online study and teaching methods
Design principles:	<ul style="list-style-type: none"> • Integrate SD into curriculum development, as ODP can increase access in terms of location, gender and modes of study to support development of competences in SD through online course availability, integration of SD in thesis and project work as well as working life collaboration, and by offering free and open online courses, materials and tools related to SD
Online degree programme layer	
Design elements:	Pedagogical, technical and collegial support for ODP community; ODP education through co-creation and co-teaching; Multicultural staff and student ODP community as part of the organisation; <i>National access to wider online and onsite community for collaboration in studies and achievement of SD competences</i> ; ODP in international context; Cultural etiquettes; Shared rules and ways of working for respecting cultural identities in multicultural virtual teams
Design principles:	<ul style="list-style-type: none"> • Collaborate nationally to enhance multidisciplinary work and SD development as well as allow better accessibility to studies, integration of SD goals and develop students' understanding of SD as whole • Collaborate nationally to create competencies and generic skills needed for working life and support the achievement of SD competences through professional development

The design elements and principles from each cycle were combined to create the final framework for the design of ODPs in HE. The principles and elements include the viewpoint of the organisation, pedagogy, support needed for ODP teaching, support needed for studying in an international and intercultural ODP setting and integration of SD in national collaboration. The final framework with accompanying principles is presented in the next chapter.

6 Pedagogically Informed Holistic Design Framework

This chapter presents the pedagogically informed design framework for the holistic design of ODPs in HE with the accompanying design principles. The design framework, design elements and accompanying principles are based on the theoretical and empirical data collected in sub-studies I-IV. Each sub-study included one DBR cycle with one or more phases where the model and accompanying design principles were created and refined in iterative cycles 1-4.

In this study, ODPs were designed as a new type of education in the HE organisation as a strategic initiative (Reason et al., 2015) to design higher education programmes (Ashwin, 2020) through a holistic approach (Kek & Huijser, 2017) where students would have useful and desirable services through the integration of service design levels (Moritz, 2005) that function in the digital context of the organisation (Kampylis et al., 2015; Laurillard, 2012; Tondeur, 2018) and pedagogy has been implemented on all levels (Harper & Vered, 2017; Paniagua & Istance, 2018; Konst & Kairisto-Mertanen, 2020).

The first set of design principles for the pedagogically informed holistic design of ODPs were created in Cycle 1, and they were modified after each cycle 2-4 (see Chapter 5, sub-studies I-IV). From the design principles, key elements (Cobb et al., 2003, 9) were selected and placed in the three-tiered framework created in Cycle 1. For the purposes of creating the final design framework, the elements were reduced to key words or concepts to represent the essence of each element. The key words or concepts were selected so that they would combine or summarise the main ideas of similar elements. As an example, in the Organisational level there is more than one element that refer to strategic decisions, thus the key concept was reduced to 'organisational strategies and culture'. Finally, the service design levels (Moritz, 2005) were integrated in the three design layers.

The framework comprises 15 design elements on three design layers: Organisational, Pedagogical and Online degree programme, which also include the service design levels of processes and features, experiences and strategies. Figure 5 presents the pedagogically informed design framework for the holistic design of ODPs in HE.

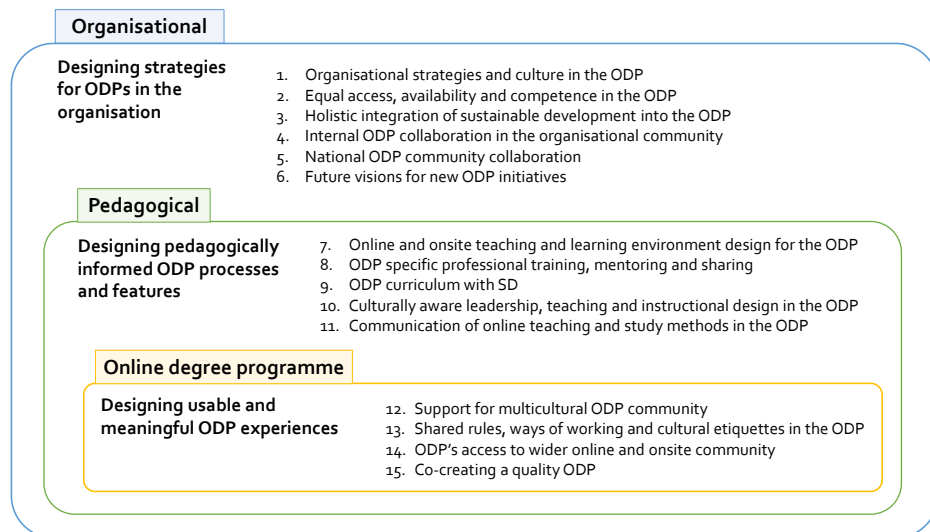


Figure 5. The pedagogically informed holistic design framework for ODPs in HE

The resulting design framework gives organisations and practitioners a practical tool to use in the design of ODPs in their local context. Organisations that do not have previous experience of ODPs and are planning to offer ODPs as a new type of education can utilise the design framework when planning to offer ODPs where all education and support services are online. It can also be used to adjust existing ODPs to implement the ODPs as a new type of education from a service design point of view. The framework can be used to design ODPs on three layers: Organisational, Pedagogical, and Online Degree Programme, which are presented in more detail below. The accompanying design principles offer further guidance in planning actions and engaging key personnel during the design process.

6.1 Organisational layer

The first layer of the framework is the Organisational layer that focuses on designing strategies for ODPs in the organisation that are needed to create the basis for the construction of ODPs in a digitally competent context. This layer integrates service design Level 4 (Moritz, 2005) that refers to the design of strategy, philosophy, policy or ideology. The layer comprises six design elements, including e.g., organisational, pedagogical and digital strategies, but also policies on national collaboration for online studies and sustainable development (Table 7).

Table 7. Organisational Design Layer

DESIGN LAYER: ORGANISATIONAL	
Designing strategies for ODPs in the organisation	
DESIGN ELEMENT	DESIGN PRINCIPLE
1. Organisational strategy, inclusive pedagogical strategy and organisational culture in the ODP	<ul style="list-style-type: none"> a. Choose strategic starting points for the online degree programmes (ODPs), including pedagogical, digital and design strategy b. Assess quality to ensure application of strategic approaches in ODPs c. Present a clear organisational culture from the beginning of the ODP studies d. Allow discussions between various stakeholders of the organisation during the ODP design process e. Make collaborative activities as well as co-creation and co-design central in the design process of a new ODP
2. Equal access, availability and competence in the ODP in a digitally competent organisation	<ul style="list-style-type: none"> a. Use the same digital tools and working methods to enable equal access and competence in the ODP irrespective of location b. Check the digital competence of the organisation for provision of strategic approaches in the ODPs c. Support the development of SD competences through online course availability by offering free and open online courses, materials and tools related to SD in the ODP
3. Holistic integration of SD for accessible, open and agile achievement of competences in the ODP	<ul style="list-style-type: none"> a. Integrate SD into the ODP by focusing on quality, accessibility, availability, openness and agility in the ODP studies that enable the achievement of SD competences for future professionals in work life b. Enhance quality ODP education by including impact of ODP as a study mode to calculate carbon footprint
4. Internal ODP collaboration for consistency and shared online and onsite organisational community	<ul style="list-style-type: none"> a. Facilitate the need to belong to both ODP and onsite community of the entire organisation for both ODP students and staff. b. Collaborate for organisation-wide consistency in application of strategic approaches in the ODPs c. Create a sense of community and belonging in the ODPs d. Enable internal collaboration to create a link between the ODP and onsite community e. Enable internal collaboration amongst the ODP staff in different degree programmes f. Give teachers opportunities to link their ODP teaching role to the onsite role
5. National ODP community collaboration to support student wellbeing, create new international possibilities and implement SD actions	<ul style="list-style-type: none"> a. Collaborate nationally to create and support an ODP community, which in turn can promote student wellbeing and create new possibilities for international collaboration and exposure in the ODPs b. Collaborate nationally to support the co-operation and communication sustainability competency through various actions in the ODPs, such as multidisciplinary work, professional development, curriculum development, supporting community and international exposure c. Collaborate nationally to enhance multidisciplinary work and SD development in ODPs to allow better accessibility to studies, integration of SD goals and development of ODP students' understanding of SD as whole d. Collaborate nationally to create competencies and generic skills needed for work life and support the achievement of SD competences through professional development in the ODPs
6. Future visions for implementing new initiatives in ODP education with managerial support	<ul style="list-style-type: none"> a. Include organisational community, management support and future predictions for continuous redesign of the ODPs b. Include future visions and foresight in the design of ODPs to create new types of degree studies and agile ways of achieving the needed SD competencies c. Offer managerial support in implementing new initiatives in ODP education

The Organisational layer design elements work as a practical tool to start the process of constructing ODPs as a new type of education in an organisation where ODPs have not been offered before. The elements specify the key components that are needed in the initial stages of the construction process to design strategies for the ODPs. The process is guided by the design principles that work as a type of

checklist for practitioners, i.e., managers, coordinators or educators responsible for the planning of the ODPs within the organisation. Although the focus of this layer is on the educational organisation, the national collaboration amongst other HE organisations also takes an important role.

6.2 Pedagogical layer

The second layer is the pedagogical layer where the pedagogical strategy of the educational organisation is implemented in the structure and operations of the ODP in the digitally competent context. This layer integrates service design level 1 (Moritz, 2005) that refers to the design of features, i.e., product, service and space, and level 3, which is the design of processes and systems. The Pedagogical layer of the holistic design framework includes design elements relating to e.g., teaching, learning, environments, curriculum and staff training (Table 8).

Table 8. Pedagogical Design Layer

DESIGN LAYER: PEDAGOGICAL	
Designing pedagogically informed ODP processes and features	
DESIGN ELEMENT	DESIGN PRINCIPLE
7. Online and onsite teaching and learning environment design for the ODP	a. Create online and onsite environments for the ODP that support the implementation of the pedagogical strategy in a digitally competent organisation
8. ODP specific professional training, mentoring and sharing of good practices for pedagogy and technology	a. Give support for both the pedagogy and technology in the various environments of the ODP, extending from campus to home and from online to onsite. b. Train staff to apply pedagogical strategy and utilise elements of digitally competent organisation in implementing the ODP education c. Offer possibilities for collegial support and sharing of experiences and solutions in terms of professional training, mentoring and collaborative design in the ODP
9. ODP curriculum design with SD	a. Make elements of pedagogical strategy and digital competence visible in the ODP curriculum design b. Integrate SD into curriculum development, as ODP can increase access in terms of the location, gender and modes of study to support development of competences in SD through online course availability, integration of SD in thesis and project work as well as working life collaboration, and by offering free and open online courses, materials and tools related to SD
10. Culturally aware leadership, teaching and instructional design in the ODP	a. Create design templates for the ODP learning environments that enable and enhance the implementation of pedagogical strategy in implementing ODP education b. Create standardized online course structure with culturally diverse contents and materials in the ODP c. Train teachers and students in intercultural communication online from the beginning of the ODP studies to enhance understanding of other cultures d. Enhance teachers' leadership skills for leading and supporting culturally diverse teamwork in the ODP e. Train teachers in online teaching skills and using online learning environments for culturally diverse ODP groups
11. Communication of online teaching and study methods in the ODP to future students	a. Market pedagogical strategy as a differentiator for ODPs in a digitally competent organisation b. Inform future students of the pedagogical solutions of the ODP in the online environments through marketing

The Pedagogical layer design elements support the design of ODPs by ensuring that the strategic decisions made in the Organisational level, including the choice of pedagogical strategy, can be implemented in the processes and features of the ODPs. The elements refer to the key components that are important for the pedagogically informed planning and facilitation of teaching and learning to fulfil the required features of the ODPs in the requires space, i.e., the onsite and online teaching and learning environments. The design principles give practical guidance for practitioners, i.e., managers, coordinators or educators responsible for implementing the ODP processes to highlight the pedagogy, such as systematic marketing where the pedagogical aspects of the ODP study are highlighted to inform the end-user, i.e. the prospective ODP student, of the intended pedagogy and learning experiences offered.

6.3 Online Degree Programme layer

The third layer is the resulting ODP that offers students a quality learning experience in a well-supported online community to ensure that the online degree education is experienced as intended. The purpose of the design in this layer is to offer online degree education that will create a quality learning experience following the implementation of the pedagogical, digital and organisational strategies and processes. The Online degree programme layer refers to service design Level 2 (Moritz, 2005), which is the design of the client experience. In the Online degree programme layer, the design elements include studying in a collaborative and inclusive community with access to education and support (Table 9).

Table 9. Online Degree Programme Design Layer

DESIGN LAYER: ONLINE DEGREE PROGRAMME	
Designing usable and meaningful ODP experiences	
DESIGN ELEMENT	DESIGN PRINCIPLE
12. Pedagogical, technical and collegial support for multicultural ODP community	<ul style="list-style-type: none"> a. Provide continuous pedagogical, technological, and organisational support for the staff and students in the ODPs b. Support the staff and students' wellbeing in belonging to an ODP community as part of the educational organisation c. Support the need to collaborate and be supported in the ODP d. Have a cultural mix of international students and staff members in the ODP e. Support the ODP education and community in international and intercultural contexts
13. Shared rules, ways of working and cultural etiquettes in the ODP	<ul style="list-style-type: none"> a. Create shared rules and jointly agreed ways of working in a culturally and linguistically diverse ODP context b. Respect individual cultural identities within culturally diverse virtual teams in the ODP c. Support cultural distance from the main culture of the ODP by introducing cultural etiquettes
14. ODP's access to wider online and onsite community in national and international collaboration	<ul style="list-style-type: none"> a. Give ODP students and staff access to wider international community via online means b. Give ODP students access to free and open studies to support achievement of SD competences through national collaboration
15. Students and staff co-creating a quality ODP	<ul style="list-style-type: none"> a. Include online degree teaching staff and students as active participants in the co-design of an ODP b. Offer ODP education through co-creation and co-teaching c. Provide ODP education that is consistent with strategic approaches and meets the quality criteria

The design elements of the Online degree programme layer support the design of ODPs by aiming to create useful and meaningful learning experiences for the ODP students through careful planning and the implementation of elements in the two previous layers. The elements refer to the key components that are essential for the students to belong in an ODP community where they are supported in both learning and belonging. They are also given new opportunities through ODP collaboration and participation. The design principles work as a tool for practitioners, i.e., managers, coordinators or educators responsible for realising the ODP education to put into practice the intended strategies and pedagogies in a way that creates useful and meaningful learning experiences.

To conclude, the final holistic design framework combines the theoretical and empirical data from the four sub-studies of the DBR process. It is intended to be used as a practical tool to design ODPs in HE organisations that are interested to integrate their pedagogical strategy and digital competence in creating ODPs as a new type of education to create meaningful learning experiences. The next chapter discusses the results of the study and the final framework.

7 Discussion

The main aim of this study was to answer the research question “*What kind of model can be created for the pedagogically informed holistic design of online degree programmes in higher education?*”. To answer the research question, four sub-studies were conducted as part of the DBR process to create a pedagogically informed design framework for holistic design of ODPs in HE. The framework integrates the digital competence of the HE organisation and its pedagogical strategy with the specific requirements for ODP studies and services online to create meaningful learning experiences in HE. As part of a DBR process, the designed artefact will result in theoretical contributions (Barab & Squire, 2004). This study contributes to educational design research (Goodyear, 2005) and online learning (Harasim, 2000) in HE research (Teichler, 2015) in Finland (Välimaa, 2012).

The themes of globalisation, digitalisation and future visions on society, work and HE were considered through theoretical literature and national education policy documents. Already two decades ago, Howell et al. (2003) listed trends to be considered when planning online education. When comparing the results of this study to the trends presented, it seems that parallels can be found: We are still discussing competence-based education, the distinction between local and distance students is still blurry and professional training courses and increased resources are still in demand. Future visions were considered in the four sub-studies, and in Sub-study II, it was identified that future visions for shared practices in ODPs need to be addressed for ensuring quality of teaching and learning both nationally and internationally. In Sub-study IV, ODPs were found to be a dimension of utilising future visions in the design of new types of HE delivery modes. It is possible that ODPs are seen as one likely delivery mode for future HE and therefore linking future visions to the development of ODPs is necessary. In Finland, the visions for HE organisations to create more personalised and flexible study paths (Ministry of Education and Culture, 2017) may be partly met through ODP design.

In this study, the ODPs can be seen as an increasing degree study mode in HE and therefore their development is considered important. One reason for this can be seen arising from the increasing need for development of online studies following the recent pandemic (OECD, 2021). In Finland, HE organisations need to produce more graduates in the labour market (Finnish Government, 2021b) according to the guidelines in the funding model but without risking the quality of education (Nenonen, 2020). The quality of the online programme has been found to aid completion of studies (Yang et al., 2017). Indeed, it is

interesting to consider how much of HE development is directed by national policy documents and funding models as opposed to academic research results. In this study, quality was an important consideration in the framework. In Sub-study I it was found that by adopting the holistic approach, quality can be created at the organisational level. In Sub-study II, it was found that teachers need to be supported to create quality education in a standardised manner to support the organisational approach, which in Sub-study III was found to be influenced by cultural aspects. In Sub-study IV, SD was found to support the aim for quality education. In this study, quality in education is created through the holistic design that standardises the organisation-wide inclusion of key elements and principles found to be essential in ODP design.

Desai (2008, 329) predicted that a new shift may be taking place in online education towards a scenario where “face-to-face learning may even become a peripheral activity in the near future”. In this study, this prediction was not confirmed as the results from Sub-studies I and II indicated a need for a closer connection between onsite and online environments and identities. The teachers highlighted the importance of belonging to the onsite community and expressed a wish of not limiting their role and identity only to the ODP context. Similarly, the students expressed a desire to link to the wider online community as well as belonging the HE organisation’s culture, combining online to onsite community. This implies a future that may be closer to that of Castells (2014) where there is a close connection between virtual and real-life networks in a so-called ‘hybrid world’.

Central to this study is the concept of holistic design, which in this study encompasses the following holistic concepts throughout the organisation, i.e., whole-of-institution approach (Kek & Hujser, 2017). In online education research, the focus has often been on course design instead of researching the effectiveness of the entire online program (Kumar, 2014), and this study enriches the understanding of educational design and online learning by approaching the design from a holistic point of view. In sub-study I, the initial three-tiered holistic design model was created. In Sub-study II, the holistic design model was found to be useful especially for those organisations that do not have previous experience of constructing ODPs and wish to utilise university-wide practices and support their staff in the implementation of the holistic model. In Sub-study III, the holistic approach was found to be useful for those organisations planning to design international ODPs. In Sub-study IV, the results showed possibilities for the holistic approach in the integration of SD into ODP where the focus is on accessible, open and agile ODP studies that support the development of SD competences for future work life. Moreover, in Sub-study IV, the holistic view was expanded to the surrounding environment and society according to Findler et al. (2019), where one finding was that in the future, carbon footprint could be calculated, and students and staff could make a conscious strategic choice by choosing an ODP as a study mode.

One issue found in the holistic approach in Sub-study I was found to be that the organisational approach may place emphasis on the organisation rather than on the end-product. As service design can complement DBR through user-focused design (Keskitalo & Vuojärvi, 2018), service design was included in this study to solve the issue of focusing on the organisation only.

The holistic design was pedagogically informed by integrating the HE organisation's pedagogical strategy called innovation pedagogy (Konst & Kairisto-Mertanen, 2020) to achieve the full benefits of the pedagogical approach (Harper & Vered, 2017). It is important to note that the innovation pedagogy itself was not the target of research in this study, although some implications of its use can be inferred based on the study. Pedagogy is one of the key success factors of an ODP (Rovai & Downey, 2010). Not all HE organisations have a pedagogical strategy, or a whole-of-institution level (Kek & Huijser, 2017) pedagogical approach or it may not be followed in a systematic manner, which, could also indicate the principle of academic freedom in science universities. In Sub-study I, it was found that it would be important to integrate the pedagogical strategy in all levels of the ODP design as a strategic approach of the HE organisation. The pedagogical approach was further examined in Sub-study II, where it was concluded that the holistic model could support the implementation of the organisation's pedagogical strategy online. Moreover, in Sub-study II it was considered that including the teachers as practitioners of the pedagogy in the design phase can aid the organisation-wide implementation of the pedagogy to ensure consistency. Pedagogy was seen as important by both students and teachers, who identified the need for support in the use of pedagogy in the digital context in Sub-studies II and III. Thus, it is important for a HE organisation to determine its pedagogical strategy and ensure that the support for its application is offered both in the design and implementation stage of the ODPs.

The chosen technology should support the pedagogical and ethical views and lead to better success in the integration of the pedagogy and technology (Jefferies et al., 2007). In this study, the pedagogical strategy of the HE organisation was integrated with the digital competence in the holistic design. The DigCompOrg framework (Kampylis et al., 2015) was used to include the organisation's readiness to offer online education (Lockhart & Lacy, 2002). In Sub-study I, it was concluded that organisations should evaluate their digital competence to determine the availability of educational and support services online. In sub-study II, the teachers expressed the support need for the use of technology and pedagogy, and in Sub-study III, the students expressed the clear need for teachers' online teaching skills. In Sub-study IV, the digital context was seen relevant in the joint efforts to integrate the SD in future online education. An interesting finding in Sub-study IV was that online learning environments may not need to be collaboratively developed in the same way as pedagogical approaches to support the development of SD competences.

This study takes part in the critical education research (Cohen et al., 2007) by means of social change to create a pedagogically informed framework that can help reduce the power of technological dominance in the online learning world. Hildebrandt (2019, 217) questions “the future of educational technology and the dominant narrative of a ‘universal technological solutionism’” and continues to ask that “instead of asking how the educational system can be more efficient ask how the work of teachers can be enriched through the use of technology when needed, and how can the social structures and institutional culture that are possibly constraining student’s agency in digital spaces be addressed so that social change is possible.” Also, Laurillard (2012) states that tools and technologies are drivers for education but rarely the other way around. The technological dominance has also been witnessed during the recent pandemic where the focus has been on digital platforms implemented for emergency remote teaching (Hodges et al., 2020) rather than the focus on pedagogical use of them (Adedoyin & Soykan, 2020). Indeed, Behnagh and Yasrebi (2020) suggest that the pandemic has highlighted that technology cannot be free of ideologies or social relations which determine the extent to which technological resources are distributed. This was also revealed in Sub-studies III and IV, where the need for equal access and competence regarding tools, training and education was highlighted as an important aspect of ODP design. In Sub-study III, it was found that equal access and competence was supported by everyone learning to use the same tools.

The concept of equal access and competence was extended in this study to the design of inclusive education. Inclusive education encompasses multiple perspectives, cultures, experiences, and ability for all students (Artiles et al., 2006; Moriña, 2017; Bodhi et al., 2021). In Sub-study I, it was found that building the sense of community is valuable for the well-being of the staff and students, and a connection can be made with the aim for better life and sustainability in the pedagogical strategy of the HE organisation and inclusive education. In Sub-study II, teachers expressed the wish to extend the concept of community from online to onsite for both students and staff. In Sub-study III, the students also expressed a need to belong to the wider HE organisational culture, supporting the findings (Bodhi et al., 2020) of the need for the organisation to communicate their behavioural patterns to indicate they are part of a larger society. Further, according to the results of Sub-study III, student wellbeing could be promoted through national collaboration. In Sub-Study IV, ODP as a study mode was found to support gaining digital and SD skills for work life through accessibility to free and open online courses, in turn supporting student wellbeing through belonging to community. This study supports the earlier findings (Goodman et al., 2017) that it is possible to increase access to HE studies through ODPs by offering it as an additional study mode to give options for different applicant pools.

The inclusive design principles of this study are especially relevant for designing international ODPs, where an interesting finding in Sub-study III was that

students seemed to prefer shared ways of working online, despite their cultural background influencing the online presence, supporting the importance of equal ability and access to tools. Although previous research has shown that students in an international programme are already interested in international and intercultural issues (Feast et al., 2011), in Sub-study III it was revealed that those students with previous experience of studying in a culturally diverse group online expected more support for students and more training for teachers, which could be interpreted to show a need for inclusive design. In Sub-study III, in addition to general cultural awareness needs, other training needs for inclusive design were found, as teachers should be able to lead culturally diverse groups online, create culturally diverse teaching materials and use online learning environments to teach culturally diverse groups. It can be assumed that the design principles in this study support the needs for the internationalisation of the Finnish HE (Finnish Government, 2021b) and the goal of producing graduates with SD competences (ARENE, 2020; UNIFI, 2020) for the society to work and sustain in the multicultural society of the future (Sinisalo & Raudaskoski, 2017).

Strategic planning can be used for SD commitments of the HE organisation to integrate SD in the organisation's other planned activities (Leal Filho et al., 2020), since holistic approaches are lacking (Findler et al., 2019). SD was the focus of Sub-study IV, and it was found that including SD in the holistic design can further strengthen the sustainable values and culture in the educational organisation. Moreover, it was found that ODP can be sustainable through holistic integration of SD where it is included in curriculum and thesis work, as well as support the achievement of SD competences in national collaboration. National collaboration amongst HEs was found to enable the provision and enhancement of the SD competences, thus supporting the shared commitment to SD goals by both UASs (ARENE, 2020) and scientific universities (UNIFI, 2020). An interesting finding was that the results indicated a focus on the students' SD competences instead of the staff's competences, which can indicate the focus on the mission of the UASs of producing professional graduates for the work life (Arene, 2018).

In this study, the ODPs were designed as a new type of education, not alongside a campus-based programme, but to replace a campus-based programme with an online version. The need for support when introducing a new type of education is evident as the staff have no experience yet (Harasim, 2000) and professional development is important (Naidu, 2019; Murtonen & Vilppu, 2020). In Sub-study II, it was found that participating in the development of a new type of education creates new needs as well as possibilities for professional development. In this study, the teachers and students were participants in the first ODPs in the HE organisation, and, therefore, did not have previous experience of ODPs. It is important to remind of the fact that although the recent COVID-19 pandemic may have increased the online delivery of HE (OECD, 2021), ODPs are still a new type of education in

many HE organisations and therefore knowledge on how to design, deliver and complete ODP education is not automatically part of a teacher's professional identity or competence, especially for those new to teaching (Murtonen & Vilppu, 2020), or teaching in multicultural online contexts (Warren, 2018) for the first time. An interesting finding in Sub-study II was the teachers' need for closer collaboration between both online and onsite community. Therefore, when designing a new type of education, it is important to keep in mind that connection to the other types of HE delivery modes may be relevant. In general, it is important to include teachers in the design phase to ensure that their views are heard and the transmission of possible negative feelings in the implemented education can be avoided (Taatila & Reunanen, 2021), as this can benefit the students in the well-designed integration of the pedagogy.

Moreover, sharing good practices to produce standardised quality education (Paniagua and Istance, 2018) becomes important, as in Sub-study II it was identified that comparing practices with those who have offered ODPs for a long time could be valuable. In this study, the change to the new type of education can be considered significant, and the results support the earlier findings by Keinänen and Kairisto-Mertanen (2019) where the role of management is important in leading the change. It can be suggested that in this study, the education is no longer considered only as a traditional teacher-student interaction that takes place in an educational establishment but rather as a high-quality service that the educational organisation is offering to benefit the end-users and wider community. The research question set at the beginning of this study is answered through the creation of the holistic design framework where pedagogy, digital competence, inclusion and sustainability are integrated to meet the needs of new HE delivery modes.

7.1 Discussion of the design framework

The design framework and accompanying 15 design principles are the main contribution of this study and provide an answer to the main research question about a suitable model for holistic design of ODPs as a new type of educational service in a HE organisation. The value of the framework lies in the practical application of the theoretical and empirical data (Barab & Squire, 2004) where design elements and accompanying design principles are placed on three design layers: Organisational, Pedagogical and Online degree programme level. These levels also include the service design levels of processes and features, experiences and strategies. The 15 design elements and accompanying principles provide organisations and practitioners with the key characteristics that make up the holistic framework. Design principles are the result of a DBR process in multiple iterations with various stakeholders (Anderson & Shattuck, 2012).

Each of the design elements and principles are based on the systematic iterative research completed in sub-studies I-IV and created by using both theoretical and empirical data. The design elements can guide organisations and practitioners to plan appropriate actions and engage key personnel to ensure that the design can be implemented on all three layers. The elements are general in the sense that they do not dictate specific instructional or operational strategies of implementing the elements in the design. However, although they are general, they summarise a wide range of important topics for the designer. There are 1-5 design principles for each element that guide the user on how to implement the elements in their own local context. The principles can create value to organisations or practitioners using the framework, as they can explain the use of the framework and offer a deeper understanding of how to design useful and meaningful ODP study experiences. It must be noted that the elements and principles only represent the themes that have been the focus of this study, and therefore cannot be considered to be suitable for all situations where ODPS are designed or developed.

The strength of the framework and the design principles is the holistic approach that integrates pedagogy throughout the design of sustainable and inclusive quality online degree programmes as a new type of higher education. The holistic approach of the framework gives organisations the possibility to utilise shared designs and practices in all their ODPs, which in turn can ensure fidelity to the agreed-on approach (Paniagua & Istance, 2018). This may also bring cost-effectiveness when the same design can be multiplied in many ODPs rather than creating a different one for each. This can be significant for organisations and managers when planning to implement new ODPs, as cost-effectiveness has been identified as something that competes with quality of online degree education (Rovai & Downey, 2010).

Another aspect that may bring cost-effectiveness through holistic design is examining the digital competence of the organisation and making investments in infrastructure and resourcing as a planned and centralised whole-of-institution activity. The strength of the framework here is the use of DigCompOrg (Kampylis et al., 2015) since it focuses on pedagogy in addition to technology, reducing the risk identified by Hildebrandt (2019) about using learning management systems and online learning platforms as tools for organisational management instead of focusing on the design of learning. On the other hand, the holistic approach can also be seen as a possible weakness, as it restricts the inclusion of some more specific aspects that may add value to the design of new type of education or services. For example, disciplinary differences were identified to be relevant for learning design (Carragher Wolverton & Guidry Hollier, 2019) and student satisfaction (Alhija, 2017). In this study, the design was considered only from the organisational holistic viewpoint and disciplinary differences were not considered, although three different disciplines were examined as the targets of the study. This implies that the framework should be further tested in different disciplines to determine if

the holistic design principles can be applied in all study fields or if subject-specific modifications are needed.

In the use of the framework, the focus on organisational approach can also be a weakness, as it places emphasis on the design needs of the organisation as the education and service provider, rather than approaching the design from the needs of the user. Thus, the suggestion made by Keskitalo & Vuojärvi (2018) that service design may offer a user focus to complement a design-based research process was followed in the study. Due to the changing role of HE in the society as well as increased competition, there is a need to design quality experience and services for the user (Paricio, 2017; Taatila, 2017). In the framework, the service design levels (Mortiz, 2005) are combined to show how the design considers the experiences of the users, the processes and features created for the users and the strategies employed in the design process. Organisations can use the framework to design a new type of education to respond to the needs of future ODP students. Therefore, service design is used in the framework to include the user-focused design element. This can be considered to be the innovative aspect of the framework, as service design has not been included in the design of ODPs in this manner previously.

To conclude, organisations and practitioners can use the framework in the design of inclusive, sustainable and meaningful teaching and learning experiences in ODP education. The design principles offer more detailed information and characteristics of the elements in the framework. The design elements and principles that are categorised in the three design layers can be utilised by designing one layer at a time or by choosing relevant elements and principles from each layer. Organisations can place the framework's elements and the design principles in their own reality by implementing their own pedagogical strategy and assessing their organisation's digital competence to create ODPs as a new type of education in local, national and international contexts. In the design process, the organisation can engage various stakeholders to ensure that the holistic design viewpoint is included in designing for the end-user.

7.2 Methodological evaluation

The research met the overall aims set at the beginning of the study and the use of DBR can be considered to be a suitable methodology for this study. DBR process aims to produce a model that is applicable to a wider audience, is iterative and offers new educational knowledge (Juuti & Lavonen, 2006). All the DBR principles were followed, documented and reported according to ethical principles of academic research, and the DBR process was described as a whole at each stage of the research process to increase the reliability and credibility of the research (Barab & Squire, 2004). The study was situated in a real-life context of the local HE organisation and

its new ODPs and focused on the testing of the ODP model that was developed further based on the experiences of the users that represented both researchers and practitioners. As a result of the study, a holistic design framework and accompanying design principles were created for the pedagogically informed design of online degree programmes (ODP) in higher education (HE) as a new type of education for ensuring meaningful learning experiences.

According to DBR principles, this study enriches the theoretical knowledge that currently exists (Barab & Squire, 2004) about ODPs in and outside of Finland. The results of the study contribute to the development of Finnish HE by bringing new knowledge about ODPs in Finnish HE and the possibilities that HE organisations have to design and develop ODPs either within the organisation or in collaboration with other HE actors. New knowledge was also added to previous research on ODP design by combining the perspectives of educational organisation, its digital competence and pedagogical strategy to levels of service design. Support for teachers and students was considered in the design of sustainable and inclusive ODP education in local, national and international online contexts. It can be seen as a strength that the articles reporting on each sub-study were published in journals representing different geographical and thematic areas, enabling the participation in scientific discussion in Finland and worldwide. The results seem to support previous findings that the local context may push to imagine its applications on a wider scale in other contexts (Barab & Squire, 2004).

DBR attempts to bridge the gap between theory and practice (Alghamdi & Li, 2013), and by combining information from national policy documents, theoretical literature and empirical data, the study contributed to educational design and online learning research. The national policy documents and the theoretical literature form the basis of the background literature of this study, but a systematic literature review method at the beginning of the study would have brought a wider theoretical base for the study. However, the search tools for the literature research available for the author at the time were limited and the problematic terminology posed challenges in searching for the suitable literature. Perhaps limiting the terminology further at the beginning of the study would have focused the search better, although it must be noted that research on ODPs in Finland was not available and therefore it was necessary to expand the search widely to other terms to find relevant data.

Multiple methods were used in the study to increase reliability and validity (Wang & Hannafin, 2005) to support the pragmatic approach of the research for solving problems and informing future practices (Saunders et al., 2019) to create a practical model for designing online degree programmes. The research was mostly qualitative but in sub-studies III and IV, quantitative methods were used as a basis for the qualitative part. The qualitative methods include various different methods in all sub-studies, which increases the reliability and objectivity of the research. The use of quantitative methods was limited but added value to the research, as they

enabled the author to handle a larger amount of data in sub-study II to determine themes for the thematic focus group interview, and in sub-study IV, they allowed for a more objective view from an otherwise small group of participants. However, the quantitative data could have been presented differently to better highlight the small number of participants in all Sub-studies. To increase reliability, the participants were described in detail to conform to the qualitative research principles.

The various methods of data collection included thematic literature research, focus group interviews, electronic questionnaire, and participatory design. The data analysis methods included comparative analysis, coding of data, quantitative analysis, and thematic content analysis, which all conform to DBR methods where the role of participants is active, and their involvement brings different expertise into producing and analysing the data (Barab & Squire, 2004). The methods of data collection were in line with a holistic approach (Kek & Huijser, 2017) and service design principles, where the views of multiple stakeholders (Moritz, 2005) add value to the design (Ryttilahti & Miettinen, 2016). The holistic approach adopted in this study was widely utilised in terms of the theoretical literature from various disciplines, which can be seen as a strength of this study. The theoretical frameworks selected for the study, namely digitally competent organisation (Kampylis et al., 2015), pedagogical strategy (Konst & Kairisto-Mertanen, 2020) and service design (Moritz, 2005), were all suitable for a holistic approach, as they already had an innate systemic approach, which enabled them to be adopted in the whole-of-institution (Kek & Huijser, 2017) approach. The theoretical frameworks were complemented by empirical data from Sub-studies I-IV and merged into one practical tool for holistic ODP design.

This DBR study (Design-Based Research Collective, 2003) consisted of four sub-studies where each included a cycle with various phases. The DBR cycles were used alongside theoretical background to solidify the empirical results with verified scientific data to formulate the results. These cycles contributed to the aims of the study by giving information about elements needed for the ODP model, the experiences of the stakeholders, and the design principles to guide in the use of the resulting framework. The DBR cycles were completed within a limited context (Cobb et al., 2003) which revealed important aspects of the end-users' experiences. The design principles were developed through multiple iterations. Indeed, it is a requirement of the local context for DBR to create an impact and produce demonstrable changes (Barab & Squire, 2004).

The initial model created in Cycle 1 gave the basis for further revisions, according to DBR principles (Barab & Squire, 2004). The cycles were completed according to DBR principles (Design-based Research Collective, 2003; Anderson & Shattuck, 2012). The collection and analysis of the expert interview data in Sub-study I could have been presented and elaborated on more clearly. Although the stakeholder views in Sub-study I presented an important aspect of the DBR process, the methods

could have been described in more detail to show the connection between the expert interviews and the formulation of the results for the initial model. It is possible that the author's lack of research experience at the beginning of the DBR process shows in the inadequate description of the method. This is an aspect that can be seen as a learning process for the author during this study.

This study only examined the integration of innovation pedagogy as a pedagogical strategy (Konst & Kairisto-Mertanen, 2020), and other pedagogical strategies were not considered or examined. Innovation pedagogy as a pedagogical strategy may not be suitable in all educational or geographical contexts but the focus of the study was not on the use of innovation pedagogy as such, instead it was on the integration of the pedagogical strategy of the HE organisation in the holistic design. Therefore, as the framework allows for organisations or practitioners to integrate their own organisational pedagogical approach, it is believed that the method of integrating a pedagogical strategy throughout the design is suitable for this study.

In DBR, participants are considered to be active co-participants that may bring ideas, produce and analyse the design (Barab & Squire, 2004). In this study, the number of participants can be considered to be relatively low but in the context of this study they represented the target groups well, since the context of the study is new and there were few data subjects available at the time of the research who would be able to participate within the parameters of this study in the local context. The setting of the study can be therefore considered to be unique.

Data was collected in the four sub-studies from various stakeholders to gain a holistic view. In Sub-study I, experts within the organisation informed the design to ensure that the pedagogy can be implemented in all the new educational services planned. In Sub-study II, the data was collected from the only ODP teachers in the HE organisation at the time of the study. The teachers gave their views on the initial model and thus influenced the design, confirming the view of Kali (2015) about the importance of teachers' participation in the design. In Sub-study III, the students represented the only ODP student group nationally that studied in a multicultural and multilingual ODP setting. The experiences of all current students in the year groups 1-3 at the time of the research were examined and therefore include the widest possible data group of such a learning context. In Sub-study IV, the data collection was expanded to a national group to gain a national viewpoint. Whilst the data group was small, their views can be considered relevant for this study as it represents the only such ODP focused national group available at the time of the study. Also, the participants work in various roles of expertise within online education, where the type and size of the HE organisations vary and ODPs are offered in different study fields and approaches, ensuring a wider perspective.

This study focuses on the UAS context, and the participants of this study all represent the UAS field. Therefore, the study cannot be considered to be fully representative of the entire HE context in Finland. New stakeholder groups could

have contributed their views to the design and thus make it stronger in terms of applicability. One stakeholder group that was not in the scope of this study was the science universities in Finland, and their views could have added value to the design principles, as their views may differ from the praxis-oriented mission of the UASs (Tautila & Raji, 2012). However, it is important to note that at the time of commencing this study, based on the available data, all ODPs were offered by UASs (Joshi, 2021) and therefore the data and access to suitable participants was limited. Another stakeholder group that was not in the scope of this study is work life representatives, and their views could have added value as employer views are important in the development of new ODPs (Linardopoulos, 2012). Their views could have been collected to gain a better understanding of the practical needs of future work life instead of relying on the literature only (see Section 1.1), since this study focuses on the context of UAS's where the work life orientation is an essential element of studies. However, work life orientation was presented as a viewpoint in the interviews in the Sub-studies, and therefore it can be considered that some data was included in this study in that regard.

The purpose of DBR is to impact learning and teaching in naturalistic settings (Barab & Squire, 2004), and in this study, the design of ODPs was informed by pedagogy to create better teaching and learning experiences in ODPs as a new type of education in the practically-oriented UAS. The connection to real-world settings can add value to educational technology research (Amiel & Reeves, 2008). Although the focus of the holistic design was on pedagogy, the digital competence of an educational organisation in offering degree education fully online was an essential starting point. Thus, it can be argued that the real-life setting of the ODP in the HE organisation added value since the ODPs were a new type of education and there was no prior base for ODPs in terms of pedagogy or technology.

The author took part as an active participant in the research process (Collins et al., 2004). Barab and Squire (2004) present the question of credibility and trustworthiness of the research when the researcher is involved in all stages of the process, starting from the conceptualisation all the way to implementation. The research was conducted in the local context of the HE organisation of the author and main researcher. The author was an active participant in the research according to DBR principles and held various roles during the process of the study. This increased motivation for the study as the axiological approach is value-driven with the author's own beliefs influencing the decisions during the research (Saunders et al., 2019). The author utilised multiple methods during the DBR cycles to ensure that the data was collected and analysed without the author's bias and to increase reliability and objectivity of the study.

The author's active involvement in line with the DBR (Collins et al., 2004) can also be seen a strength, as the personal experience and expertise in the subject area may have produced results that would not have been possible to achieve with a

lesser involvement. It can be stated that the author's role as a doctoral candidate in conducting this academic research has been significant. The author has been a key person in the entire study and was solely responsible for the data collection and analysis in Sub-studies I and IV. To find a balance between the various roles during the study, the author also worked with other professionals (Barab & Squire, 2004). In Sub-studies II and III, the author collaborated with two other researchers to collect, analyse and report on the results. (See Section 5 for details of the responsibilities in each Sub-study). The author was solely responsible for creating the final framework and the accompanying design principles that were based on the four Sub-studies. It should be noted that the environmental factors (Maxwell, 2008), such as the researcher's personal understanding, experience and pilot research of this study may have affected the results to some extent. The authors' personal understanding of the research topic may be limited, which in turn may have affected the research. However, as DBR processes are iterative (Amiel & Reeves, 2008), the author's understanding has increased during the research process, and there may also be future cycles that will help develop the framework and design principles further.

7.3 Ethical evaluation

Research ethics is the professional ethics of a researcher. It involves producing new information or conforming old, and what are the acceptable means of getting to the desired goal. Unethical research does not serve this purpose. Research ethics supports the researcher by ensuring the rights of the researcher, and researchers should follow the responsible conduct of research (TENK, 2021) or The European Code of Conduct for Research Integrity (ALLEA, 2017). Research has to be reliable from the perspective of the public, funding, other researchers, research subjects and overall scientific research. Ethics are present at every stage of research, in creating a research plan, data management plan, funding plan, collection of data, analysis of results, publishing results, archiving and re-using data. Ethical principles in humanities require consideration to generalising and objectivity, the ability to choose and use methods, gaining informed consent, avoiding harm, maintaining the privacy and storing of data (TENK, 2021). Data protection must be ensured from both a technical and organisational point of view (European Commission, 2018b). In addition, data should be minimised, and only necessary data should be collected or processed (European Commission, 2018b).

Research ethics in terms of this DBR research refers to the handling of data, the consent of research objects, a declaration of interests, research integrity. As an essential part of DBR, the author is an active a participant in the research. Although this may pose some ethical issues, it is, however, an integral element of the methodological approach (DBR) that the researcher has an active role in the

development. Therefore, it can be assumed that the author's involvement in the many roles has widened the viewpoint and enriched the research, in comparison to looking at it from an outsider's point of view. At the beginning, the author was working as a teacher in one of the ODPs that was a target of the study, and took part in conceptualising the initial design (Barab & Squire, 2004). Therefore, it was important for the author to declare objectivity and explain the role in the process of developing and designing the model through DBR stages. Moreover, the author is bound by teacher's ethics, the most important being respect, integrity, justice, and values.

As the study progressed, the author's role also expanded from teaching to coordination of the ODP development and also coordination of a national online degree working group. In these roles, although not the teacher, the author was still influencing the design as an active participant in all DBR cycles. The author was able to use expertise in pedagogy and online learning in the study, which can be seen as an added value to the study since the author was able to deduct from the theoretical and empirical data aspects relevant to the design. To ensure objectivity and maintain researcher's ethics, all of the sub-studied were completed following scientific requirements (Wang & Hannafin, 2005) regarding data, participants, and analysis.

An important aspect of ethical research is complying with the general data protection regulation (GDPR), i.e., how to handle the personal information from students, teachers and coordinators as data subjects. The data subjects must be informed of how their data will be handled during the research process, who has access to the data and for how long, and how is the data stored (TENK, 2021). Informed consent was gained from the data subjects, and they were informed of the purpose, objective, length, methods, roles, anonymity, further details and sharing of results. Data subjects must be fully aware of the aforementioned information, only then can their data be collected (European Commission, 2018b).

This research does not carry any risks to the freedom or safety of the data subjects, nor does it have a significant effect on them. In this study, no prior decisions from the committee for research ethics were needed, as the data subjects of the research do not involve parties that would be in the high ethics risk category. It is essential that in any research, the following research ethical questions are answered: taking care of data after research, naming authors, referring to previous research, sharing results with the public, and collaboration partners. The data and results of this study were all carefully documented, stored and published. Integrity in handling, storing, analysing and presenting data has been conducted in the research. Research data subjects have been informed of the above either orally at the beginning of the interview or in writing via email and in the electronic questionnaire. However, one ethical consideration may be that, according to GDPR regulations, any data that involves identifiable persons has to comply with EU and national law, and although

personal data may have been anonymised or pseudonymised, it may still be possible to re-identify the data subject (European Commission, 2018b).

In this study, the answers have been pseudonymised and anonymised. However, GDPR requires these two methods to be used wherever possible (European Commission, 2018b), and in this research case, too, the privacy of the data subjects has been protected by minimising the risk for unauthorised access or misuse of data. Since there can be a risk of re-identification, the information should be treated as personal data (European Commission, 2018b). Cultural validity (Cohen et al., 2007) was considered especially in Sub-study III, where the research was focused on the data subjects in multicultural and multilingual virtual groups in the international degree programme. Cultural validity is important when the researcher and data subjects represent different cultural backgrounds and involves sensitivity to participants, cultures and circumstances (Cohen et al., 2007).

Respect has been shown to other researchers in giving credit where it is due in their authorship, and the authorship agreement has been created where needed. Moreover, an agreement has to be made as to how the data can be used in the future, where the data will be stored, for how long, who has access to it. The connection to the funding and project has been noted in the research process, and these connections to funding have been made transparent and declared in any publications. Also, research responsibilities and ownership of authored material has been agreed with co-authors and co-researchers. Possible risks in this research are the storing of data; gaining new permissions for already gathered data; and self-plagiarism by referring to one's own work as if it is new. Self-plagiarism could be avoided by explaining that as part of DBR process, the purpose of the research is to further develop the model for the following cycle of DBR process.

7.4 Implications and future directions

This study has contributions to various themes within HE research (Teichler, 2015) in Finland (Välilä, 2012) in online learning, ODP design and DBR. First, the study adds new knowledge to the design of ODPs in Finland where ODP design had not been widely researched in the Finnish HE context prior to this study. Although this study was set in the applied university context in Finland, the results can be utilised by other HE organisations in Finland or worldwide.

The study has enriched the theoretical and practical knowledge (Design-based Research Collective, 2003; Barab & Squire, 2004) in the field of online learning and ODP design by combining the perspectives from various disciplines. The major contribution of this study is the pedagogically informed framework for the holistic design of ODPs in HE, consisting of 15 design elements with accompanying design principles (Amiel & Reeves, 2008) as a solution to a complex educational problem

(Plomp, 2007) to create ODPs as a new type of education to create meaningful learning experiences.

Moreover, the study contributes to existing ODP research where pedagogy has been identified as an important element in producing quality (Rovai & Downey, 2010; Ragusa & Crampton, 2017; Green et al., 2010; Jääskelä & Nissilä, 2015) by being the first study where a pedagogical strategy (Harper & Vered, 2017; Kairisto-Mertanen, 2020) was integrated in the holistic design of ODPs. As a significant result of the four sub-studies, the pedagogical design is presented as an independent layer in the resulting framework, thus making it pedagogically informed. Also, being situated in the praxis-oriented UAS (Tautila & Raij, 2012), the study may expand the understanding of how to integrate pedagogy into an ODP in the UAS context.

The holistic approach also contributes to the digital readiness (Lockhart & Lacey, 2002) and shared understanding of the environments (Moore et al., 2011) to evaluate the available resources and technologies (Moore & Kearsley, 2005) by integrating the DigCompOrg framework (Kampylis et al., 2015) in the design of an ODP in HE. Previous studies have focused on basic education and therefore it can be considered a significant contribution of this study that DigCompOrg was utilised to examine the digital competence of the HE organisation and included in the resulting holistic ODP framework.

Although the focus was on designing ODPs, teacher experiences revealed that the ODP design could be utilised in the design of the online teaching and learning in the blended education models. It may be possible to utilise the design principles of this study for blended degrees especially in Finland, where the terms blended and online degree programme are used almost interchangeably (Joshi et al., 2022a). This study adds to knowledge that stakeholder experiences and expectations are important in conceptualising a digital ecosystem when moving to blended or hybrid education (Mielikäinen, 2022). Moreover, based on the results of this study, the learning can extend beyond the ODP and the organisation, which contributes to current knowledge about creating digital learning ecosystems (Põldoja, 2016).

This study also contributes to understanding of innovation pedagogy (Konst & Kairisto-Mertanen, 2020) as the pedagogical strategy of the HE organisation. This study can be seen as one example of integrating innovation pedagogy into the design of online education, thus adding knowledge to the previous experiences of its integration to campus-based programmes. Moreover, the results can offer some new directions to the development needs identified in an internal self-assessment by the HE organisation, especially in developing the identification of students' competences, creating equal study experiences and integrating sustainable development and internationalisation into the design of new ODP education.

In addition, this study responds to the future visions and expectations set for HE in Finland and globally. This study contributes to the possible paradigm shift of a

future where online learning may be the first and preferred method over campus-based learning (Desai et al., 2008). Following the pandemic, there is an increasing need to offer quality education online (OECD, 2021). The need for online learning in the future of HE is clear, but it can be questioned if technology-based learning is the most appropriate way of learning in the future (Márquez-Ramos & Mourelle, 2018). This study does not consider online study as the preferred mode of study for the future, instead, it focuses on creation of quality in online degree education through holistic design approach.

The framework of this study along with the visions created for future online degree programme education (Joshi et al., 2022a; 2022b) are one important contribution to the national aims for making Finland a model country for flexible online learning and a global pioneer in higher education (Finnish Government, 2021; The Ministry of Education and Culture, 2017; Digivisio2030, 2021). The results of this study show that national collaboration amongst HE partners can add value to the society by creating a handprint through education. National collaboration was revealed to be important in supporting students in open and free studies, as well as in achieving common SD goals and creating a national ODP community. International aspects were shown to be a possible continuation of national collaboration and something that could open new possibilities and participation in the wider online and onsite communities.

This study contributes to the internationalisation of HE in online contexts where there is a need to include intercultural and international perspectives at program level (Crawford & Bethell, 2012) and the aim is to prepare students for global working life (Deardorff et al., 2012; Konst & Scheinin, 2018). The implications of the results are especially important for teacher training, as the study revealed training needs for leading diverse virtual groups, utilising diverse teaching materials and considering cultural aspects in their professional identity. The teachers' cultures influence their teaching and the concept of quality (Schalkwyk et al., 2015), which in turn may impact the learning experience of the students. This could imply that HE organisations should consider providing training for their staff to help them produce culturally aware materials and teaching.

Educational organisations have an important role in supporting a more sustainable future (Leal Filho et al., 2020) and this study contributes new knowledge to the shared sustainable development (SD) goals that all HE organisations have committed to in Finland (ARENE, 2020; UNIFI, 2020). In this study, SD was integrated in the design of ODPs for national cross-studies. The holistic approach to ODP design was shown to enable agility, accessibility and availability to studies where national collaboration can enhance the wellbeing of students, which in turn can have a positive impact on the society where online studies are likely to only increase in the future. A significant impact to the society was including online study mode as part of campus operations having an indirect impact to climate change (Findler et al.,

2019), which would allow students and staff to make a strategic choice in their study mode to create a handprint. The results of this study are the first attempt to combine sustainable development competences (Brundiens et al., 2020; Lozano et al., 2017; Wiek et al., 2016) to ODP design and can therefore be considered to add value to HE organisations.

Finally, the study has contributed to applications of DBR in an ODP context, as its connection to real-world settings is important in educational technology research (Amiel & Reeves, 2008) and the objective of DBR is to impact teaching and learning (Barab & Squire, 2005). This study has produced new information about using service design to complement a DBR process (Keskitalo & Vuojärvi, 2018) to bring a user-focused viewpoint. The need for creating new type of education (Dill & Teixeira, 2000) for open learning and teaching experiences with technology (Naidu, 2019) to answer the future students' needs (Márquez-Ramos & Mourelle, 2018) was approached through service design, as it can be used to create new services for specified groups (Joshi & Alavaikko, 2020). The results of the study add knowledge to creating and manage co-creative design processes in organisational and national settings (Joshi & Alavaikko, 2020) and using holistic design principles to design new services (Stickdorn et al., 2018). This is a novel approach and a major contribution of this study, as there seems to be no prior research that has combined the service design levels to the design principles of ODPs. The results of this study imply that HE organisations may be able to utilise service design when creating new educational services.

7.4.1 Implications for practitioners

The results of this study, the framework and the accompanying design principles can be useful for any HE organisation planning to create new ODPs or modify existing campus-based or blended degrees to be implemented as an ODP. The 15 design elements of the framework with accompanying principles that are categorised in the three design layers offer a step-by-step approach that can benefit in both the planning and implementation phase of the new type of education. The framework can be utilised by managers, administrators, and educators of ODPs in HE organisations and business organisations that are interested in the holistic design process of new ODPs. They can either adopt the framework in its entirety to produce outcomes relevant to their educational context or choose those elements and principles from each design layer applicable to their ODP context.

In the first sub-study, the focus was on the organisation. This may make the results of Sub-study I especially interesting for manager and coordinators who are responsible for the entire design process within the organisation, as they need to consider the whole-of-institution (Kek & Hujser, 2017) approach. The three-tiered model was created as a result of sub-study I and it approaches the design by presenting essential elements on three design layers: Organisational, Pedagogical

and Online degree programme. Those organisations who follow a pedagogical strategy in their educational operations may benefit from the use of the model, as it integrates pedagogy in the online context throughout the design. Moreover, those organisations that need to consider their readiness for online education (Lockhart & Lacy, 2002) may benefit from the evaluation of digital competence of the organisation (Kampylis et al., 2015) in the holistic design approach.

The results of Sub-study II may be of special interest to managers who lead the change to deliver new type of education (Keinänen & Kairisto-Mertanen, 2019) and support their own teachers in the change (Vähäsantanen, 2015) from the traditional teacher's role to that of an ODP teacher. The managers may find useful the experiences of the first ODP teachers and therefore can better understand the organisational and managerial support needs in terms of pedagogy and technology (Kellen & Kumar, 2021). The results may also be relevant to those teachers who are starting to teach in an ODP to gain an understanding of the aspects that new ODP teachers seem to consider important.

Those organisations who are planning to offer education in international ODP contexts may benefit from the design principles from Sub-study III that focused on designing international education through online studies (Obexer, 2018; Chipere, 2017). Pedagogical aspects are important in designing globally networked learning environments (Starke-Meyerring, 2010). The results are useful to both managers and teachers alike, as they indicate which aspects are important to consider from both organisational and instructional point of view in designing inclusive education and support services that can meet the needs of various cultures, perspectives and abilities (Artiles et al., 2006). The ODP students' experiences of intercultural and international aspects of online degree education reveal how teachers can support students in multicultural virtual groups and provide inclusive and culturally aware teaching and learning. In addition, it gives managers an understanding of how to support their staff to have the competence for working in multicultural virtual environments and to offer appropriate training for their teachers (Moriña, 2017). Moreover, it can support the new ODP teachers in transitioning from a traditional teacher's role and identity (Warren, 2018) to that of leading multicultural virtual groups in an ODP.

Furthermore, there is a growing need to integrate SD competences (Brundiers et al., 2020; Lozano et al., 2017; Wiek et al., 2016) into future HE. The framework in this study may offer a starting point for the design phase of new ODPs with a focus on SD goals. Organisations may find the results of Sub-study IV interesting as they focus on the SD goals that all HE organisations in Finland have committed to. The results highlight the importance of collaboration in the integration of SD into the ODP, which can make the discussion interesting to other HE organisations who share similar interests, goals, or commitments with partners locally, regionally or nationally. In addition, teachers may want to use the results in planning their own

teaching, as they may be able to jointly support the education for SD (Rohweder & Virtanen, 2009), development of SD competences or achievement of SD goals in national online degree collaboration, where technology may be used to enhance the integration of SD (González-Salamanca et al., 2020).

Those HE organisations who want to approach the development of new ODPs as a service (Paricio, 2017; Taatila, 2017) to diversify their offering (Dill & Texeira, 2000) may find the framework to be especially useful, as it presents the results not only as a design framework for new ODPs but for creating processes and features for usable and meaningful learning experiences. The integration of service design levels (Moritz, 2005) in this study can be useful to organisations, managers or educators who are interested in understanding how ODPs can be designed with the focus on the end-users instead of the organisation.

Finally, this study may have implications to teacher training either as a professional training or in-service training. ODPs are still a new type of education in many HE organisations, and although online teaching competences may already be part of most teacher training curricula, this may not be the case for ODP teaching competence. Teachers may not have the knowledge to design and deliver education in a new context (Murtonen & Vilppu, 2020), such as an ODP, or they may be teaching in a multicultural context (Warren, 2018) in an international ODP for the first time. It is also important to note that teachers should have the skills to co-create and co-design the ODP studies with students, and to approach the design from a user-focused viewpoint. Therefore, it may be relevant to include the design principles from this study as part of teacher training to increase the understanding of the needs for designing and delivering ODP education in local and global contexts, and to include awareness of how this may impact their professional identity and role. This is also relevant to have the ability to produce pedagogically informed processes and features in ODP teaching that take into consideration the needs of ODP students and create meaningful learning experiences for them.

7.4.2 Future research possibilities

This study has revealed many interesting new avenues for further research. Each sub-study presented a specific feature that contributed to the holistic approach, but it was not possible to examine these further within the scope of this study. Therefore, each sub-study offers possibilities for further research.

This study focused on the holistic design and therefore excluded disciplinary or subject-specific differences in the design process. However, in the future, it would be interesting to test the design framework in different disciplines and examine if different needs arise based on the field of study. Pedagogy was placed at the heart of the holistic design, and it was integrated throughout the design. In the future, it would be valuable to test the framework with other pedagogical strategies than the one used in this study.

In Sub-study I, one specific topic that arose but was not in the scope of this study was the need for inclusive design. Inclusivity was included in the final framework and design principles, but there is a need to investigate it further to fully understand the specifics of inclusive design in the context of ODPs. This study is placed in the context of Finnish HE, but the roles of teachers and students differ greatly in different regions around the world, with differing levels of access to technical and pedagogical support in providing education in a fully online setting. Therefore, it would be important to place the design principles in a different context to see what modifications may be needed for a framework that would incorporate inclusive and universal design in more detail.

In Sub-study II, teacher identity was highlighted as an important aspect that influenced the role of the new ODP teachers. Teacher identity is therefore included in the final framework as an important element to consider as part of the holistic design, but it would be important to research what comprises the concept of teacher identity in the context of ODPs. One possible avenue for research is to explore the role and identity of the teachers as new ODP teachers and compare that with their onsite teaching role. Another possibility is to examine their cultural identity in the ODP teaching context and find out the possible implications that it may have on the course design or implementing the pedagogy intended. In Sub-study III, an interesting new need for teachers' competence as leaders of multicultural virtual groups was identified. It would be valuable to understand better what this may mean in terms of professional training of teachers or support in the educational organisation. As teachers gain more experience of ODP teaching, and also an increasing number of teachers participate in ODPs, it would be interesting to compare the views of those with longer experience to those new to online teaching and investigate how the identity is experienced later in the ODP career. In addition, an interesting aspect to explore would be to see how the teacher's role will change in the future if ODPs become a more systematic and standardised mode of education in HE.

In Sub-study III, the focus was on the international and intercultural context of an international online degree programme. Although the research participants represented a wide mix of cultures, languages and online study experience, it would be valuable to widen the research to other international online contexts. The design framework could be tested in different geographical or cultural locations to see if the holistic design principles are applicable in those local contexts, or if they need to be localised to suit the needs of the educational organisations that work in different legal, societal and cultural settings. In addition, a comparison could be made with different ODP implementation models to evaluate the similarities and differences in the local and global design approaches. In Sub-study III, a specific feature that was highlighted was the virtual leadership skills of ODP teachers. Again, the concept is included in the final framework as an element, but further research is needed to

understand if virtual leadership in ODPs differs from leadership of other virtual groups and how it can be developed further through e.g., teacher training.

In Sub-study IV, the specific feature was national collaboration to develop SD competences, but it is important to further study the forms of collaboration that can promote the acquiring of the SD competences. In this study, the term collaboration was presented as something important for the organisation, the teachers, the students and for national higher education organisations alike. In order to understand the importance and the practical applications of it as well as to find suitable support mechanisms, more research is needed in all aspects of collaborative activities in ODP design and implementation. In the future, it would be interesting to find out how joint ODPs can be co-designed and co-produced. Moreover, in this study, the discussion of the national collaboration was limited to the UAS context, which raises the need to extend the discussion to the science universities and national collaboration amongst all HE organisations. Also, shared practices across universities on a national level need to be addressed and further research is needed on common solutions, frameworks and models that can be used for ensuring the quality of teaching and learning on a wider national and international scale. This work has started in a national project to create a national network for ODPs in collaboration with HE organisations (Kansallinen verkkotutkintoverkosto, 2021).

One aspect of collaboration that was not considered sufficiently in this study and would be worthy of a future study is the inclusion of working life representatives as stakeholders in the design process of the ODPs. The views of working life were considered only in terms of societal changes and expectations for the competences of the students graduating from the online degree programmes. It would be valuable to better understand how working life can take part in the design process of degree education to respond to the quickly changing needs of working life operatives. Their views could add value to the design framework by giving the educational organisations a better understanding of the type of new educational services that the working life may need or expect in the future. This study focused on the collaboration between UASs in Finland, and therefore the collaboration between UASs and science universities in Finland was not considered sufficiently. In the future, it would be important to include science universities to gain an understanding of the possible differing needs and applications of online degree programmes. An interesting study would be to create new visions for ODPs in Finnish HE where the two different educational missions of UASs and science universities would be combined to create flexible study opportunities in ODPs.

In this study, service design was used to focus on creating meaningful learning experiences for the end-user. However, the service design focus was more on the context of the organisation, less so on the end-product and its implementation. Therefore, an interesting future research possibility is to focus on designing the services by investigating the various touchpoints of an ODP and collect user data

from the end-users to further modify the service to the needs of the users. This need is further supported by the Finnish HE visions for more personalised study paths and individualised guidance requirements. This study presented the international students' experiences in the international ODP. The students were the data subjects and informants of their own experiences. However, as the results suggested, the students should be active participants in the design process of the online degree education, and it would be valuable to conduct research on the possibilities and experiences of including students as designers of ODPs. Also, in the future it would be important to understand the experiences of students in other fields of study. For example, students studying to be nurses in a fully ODP may place importance on very different aspects of the design than those in an international degree programme.

In general, future foresight methods could show different possibilities for the focus of the design framework, or the future of ODPs in general. It would be interesting to see what kind of futures could be seen for ODP education, as technological developments are progressing ever so fast and at the same time, the importance of degree education may change in the future. One question to explore is the entry of new technological solutions and how they may impact the needs of the digital competence of HE organisations, teachers and students, as well as how they may change what we now consider to be online learning and teaching, and therefore, ODPs. At the time of this study, the world is still experiencing the effects of the COVID-19 pandemic which places more demands on organising education either fully or partially online. Hybrid education models are gaining popularity in all levels of education, and it would be valuable to investigate how the design principles of this study would be applied in the online parts of the blended and hybrid degree programmes, and possibly in other educational levels than higher education. All in all, an important aspect for future research is a longitudinal study on the success of those ODPs that have utilised the holistic design framework in constructing ODPs as a new type of education. This kind of research could reveal the practical application of the framework as it is presented in this study.

7.5 Conclusion

In conclusion, it is the belief of the author of this study that the holistic approach adopted throughout the study confirms the statement first made famous by Aristoteles, "The whole is greater than a sum of its parts", as by including all the design principles created as a result of this study, the constructed online degree programme can be better than by using each set of principles individually. This study contributes to creating quality online higher education through a design framework that takes a holistic approach to integration of pedagogy in the digital, inclusive and sustainable context of online degree programmes.

By utilising the framework and accompanying design principles for a holistic design of online degree programmes, higher education organisations can make a commitment to their students and staff to offer high-quality online degree education that will benefit not only the organisation but the society as a whole. A sustainable future requires solutions for education, and quality online degree programmes can be one important part of the ecosystem of learning between higher education, society and working life. The online learning shift cannot take place overnight, the change is gradual and moving in waves from continents to countries and higher education organisations. Online degree programmes can offer great possibilities for future higher education when designed with pedagogy in mind to produce usable and meaningful experiences that work for both the organisation and its stakeholders, as proposed in this study.

8 References

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